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9

Lloyd Stevens
his Book

EXERCISES

IN

ARITHMETIC,

WITH

PARTICULAR REFERENCE TO THOSE RULES, AN ACQUAINTANCE OF WHICH IS INDISPENSABLE IN COMMON BUSINESS,

FOR

THE USE OF SCHOOLS,

ACCOMPANIED BY

A KEY

FOR

THE USE OF THE TEACHER.

BY FRANCIS J. GRUND,

Author of an "Elementary Treatise on Plane and Solid Geometry,"
"Elementary Treatise on Natural Philosophy," "Elements
of Chemistry," "Popular Lessons in Astronomy,"
"Exercises in Algebra," etc.

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CARTER, HENDEE AND CO.
1833. W

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I. R. BUTTS, PRINTER, SCHOOL ST.

PREFACE.

THE following examples and exercises in Arithmetic, have been prepared by the author for the double purpose of saving much time and trouble to the instructor, and to enable young pupils to acquire that facility and quickness in solving arithmetical questions, which shall fit them either for the counting room or any other practical business of life. Special attention, therefore, has been paid to the rules of Simple and Compound Interest, Barter, Loss and Gain, Simple and Compound Fellowship, Exchange, Practice, &c.; and no example will be found in the book which is not in itself practical, or may at least be applied to some business transaction or other. But the work must not be considered a competitor with the many good treatises on Arithmetic already before the public. It is merely intended as a companion for them, to enable the pupils to practise on the rules they may have learned, and to enlarge upon some of them for the special purpose of qualifying them for mercantile transactions.

As the book does not pretend to be a *treatise* on Arithmetic, but merely a 'collection of Arithmetical *exercises,*' it was deemed sufficient to state the rule for solving each question, and to illustrate it by *an example fully worked out, and accompanied by a suitable explanation of the process.*

Whether the Author has succeeded in his plan or not, must be decided by teachers: that a work of this kind is needed in the business of instruction, particularly in large schools, is well known to the Author, who is himself a teacher; and it is on this account, principally, that he claims the indulgence and patronage of his colleagues.

BOSTON, OCT. 1833.

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EXERCISES IN ARITHMETIC.

SECTION I.

QUESTIONS IN NUMERATION, ADDITION, SUBTRACTION, MULTIPLICATION, AND DIVISION OF SIMPLE NUMBERS.

A. Numeration.

1. Read the number, 8
2. “ “ 10
3. “ “ 20
4. “ “ 25
5. “ “ 29
6. “ “ 30
7. “ “ 50
8. “ “ 77
9. “ “ 99
10. “ “ 100
11. “ “ 150
12. “ “ 106
13. “ “ 110
14. “ “ 101
15. “ “ 194
16. “ “ 456
17. “ “ 1000
18. “ “ 3000
19. “ “ 3500
20. “ “ 4050

21. Read the number, 7006
22. “ “ 8044
23. “ “ 4704
24. “ “ 1004
25. “ “ 10,000
26. “ “ 40,000
27. “ “ 45,000
28. “ “ 40,500
29. “ “ 40,050
30. “ “ 40,005
31. “ “ 42,300
32. “ “ 34,030
33. “ “ 43,003
34. “ “ 50,057
35. “ “ 50,570
36. “ “ 57,050
37. “ “ 800,475
38. “ “ 804,750
39. “ “ 847,500
40. “ “ 840,075
41. “ “ 840,750
42. “ “ 806,700
43. “ “ 860,507
44. “ “ 966,470
45. “ “ 100,000
46. “ “ 409,000
47. “ “ *1,000,000
48. “ “ 4,004,000
49. “ “ 4,400,000
50. “ “ 4,400,400
51. “ “ 4,004,000
52. “ “ 4,000,400
53. “ “ 4,040,750
54. “ “ 4,006,075
55. “ “ 9,060,000
56. “ “ 9,000,090
57. “ “ 4,798,327

---

* It is not necessary to exercise very young pupils in numeration of more than seven figures, as in most cases, this is sufficient even in practice.

58. Read the number, 4,049,745
59. “ “ 9,840,089
60. “ “ 10,060,049
61. “ “ 48,474,000
62. “ “ 94,006,677
63. “ “ 40,000,000
64. “ “ 47,000,000
65. “ “ 41,000,000
66. “ “ 40,700,000
67. “ “ 40,070,000
68. “ “ 40,007,000
69. “ “ 40,000,700
70. “ “ 40,000,070
71. “ “ 40,000,007
72. “ “ 40,900,909
73. “ “ 147,040,000
74. “ “ 124,354,745
75. “ “ 673,400,670
76. “ “ 484,746 747
77. “ “ 6,000,700,060
78. “ “ 9,009,009,002
79. “ “ 1,040,747,890
80. “ “ 47,004,894,780
81. “ “ 48,900,000,000
82. “ “ 80,000,000,000
83. “ “ 75,007,400,680
84. “ “ 47,500,476,734
85. “ “ 32,741,000,040
86. “ “ 10,640,100,040
87. “ “ 60,000,060,005
88. “ “ 75,012,300,470
89. “ “ 670,000,089,432
90. “ “ 469,432,145,733
91. “ “ 900,945,000,045
92. “ “ 100,400,470,003
93. “ “ 2,004,673,210,047
94. “ “ 3,724,103,000,005
95. “ “ 1,000,000,000,000
96. “ “ 340,736,789,012
97. “ “ 470,001,412,000

98. Read the number, 500,500,075,432
99. " " 173,281,123,141
100. " " 3,241,341,819,141

Write the following Numbers.

1. Five.
2. Sixteen.
3. Nineteen.
4. Twentyfive
5. Fortyfour.
6. Seventy.
7. Eghtyeight.
8. Ninetynine.
9. One Hundred.
10. One Hundred and One.
11. One Hundred and Ten.
12. One Hundred and Eleven.
13. Four Hundred and Seventyfour.
14. Five Hundred and Eighty.
15. Six Hundred and Five.
16. Seven Hundred.
17. Four Hundred and Fortyfour.
18. Six Hundred and Seventyfour.
19. One Thousand.
20. Five Thousand.
21. Four Thousand Three Hundred.
22. Two Thousand Eight Hundred and Forty.
23. Two Thousand Eight Hundred and Four.
24. Eight Thousand and Sixty Three.
25. Three Thousand Two Hundred.
26. Four Thousand and Ninety.
27. Ten Thousand.
28. Ten Thousand One Hundred.
29. Ten Thousand and Eleven.
30. Forty Thousand Two Hundred.
31. Twelve Thousand and Sixtyfour.

32. Fortytwo Thousand and Ninety Three.
33. Seventyeight Thousand and Eighty.
34. Sixtyeight Thousand and Fortyone
35. Fortyeight Thousand Five Hundred.
36. Fiftyseven Thousand Three Hundred.
37. Ninety Thousand and Eightyeight.
38. Eightythree Thousand and Sixtyfour.
39. Ninetytwo Thousand Six Hundred and Eightytwo.
40. One Hundred Thousand.
41. One Hundred Thousand and One Hundred.
42. One Hundred and One Thousand.
43. One Hundred Thousand and Ten.
44. One Hundred Thousand One Hundred and Ten.
45. One Hundred and Eleven Thousand.
46. One Hundred and One Thousand One Hundred and One.
47. One Hundred and One Thousand One Hundred and Eleven.
48. One Hundred and Eleven Thousand One Hundred and Eleven.
49. Four Hundred Thousand Five Hundred.
50. Nine Hundred and Fifty Thousand.
51. Four Hundred Fiftyfive Thousand and Four.
52. Three Hundred Two Thousand and Fortyfive.
53. Five Hundred Thousand.
54. Six Hundred and Fifty Thousand and Eighty.
55. Four Hundred Seventyfive Thousand Three Hundred and Fifty Two.
56. Six Hundred Ninetynine Thousand Nine Hundred and Ninetyeight.
57. One Million.
58. One Million One Hundred Thousand.
59. One Million One Hundred Thousand and One.
60. One Million Two Hundred Thousand and Ten.
61. One Million Five Hundred Thousand and Forty.
62. One Million Fifty Thousand,
63. One Million Thirtyfive Thousand.
64. One Million Twenty Thousand Four Hundred.
65. One Million Forty Thousand and Sixty.
66. Two Millions Four Thousand Three Hundred.
67. Two Millions Thirty Thousand and Nine.

68. Three Millions and Ninety.
69. Three Millions Nine Thousand and Six.
70. Four Millions Seven Hundred and Forty.
71. Five Millions Four Hundred and Five.
72. Six Millions Nine Hundred.
73. Eight Millions and Nine.
74. Ten Millions.
75. Ten Millions Twenty Thousand.
76. Ten Millions Four Hundred Thousand.
77. Twenty Millions Sixty Thousand.
78. Twenty Millions Three Thousand.
79. Fortyfive Millions Nine Hundred.
80. Fortyeight Millions and Ninety.
81. Fiftytwo Millions and Six.
82. Twentytwo Millions and Fortyfive.
83. Fortyfour Millions Three Hundred and Eighty.
84. Seventy Millions Eight Thousand and Fortyfour.
85. Eightytwo Millions Five Hundred and Forty Thousand.
86. Fortytwo Millions Seven Hundred and Forty Thousand Five Hundred.
87. Sixtytwo Millions Four Hundred Thousand Nine Hundred and Forty.
88. Fortyeight Millions Three Hundred and Forty Thousand Nine Hundred and Sixtytwo.
89. Seventy Millions Six Hundred Fortytwo Thousand Nine Hundred and Seventy.
90. Eightythree Millions Four Hundred Sixtyeight Thousand Four Hundred and Sixtytwo.
91. Thirtytwo Millions Thirtyfive Thousand and Thirtyfive.
92. Forty Millions Twenty Thousand and Twenty.
93. One Hundred Millions.
94. One Hundred and Seventyfive Millions.
95. Two Hundred and Twenty Millions Five Hundred Thousand.
96. Four Hundred Millions Seventy Thousand Three Hundred and Ninety.
97. Three Billions Four Hundred Thousand and Twenty.

98. Fortytwo Billions Seven Hundred and Sixty Millions Four Hundred Thousand and Four Hundred and Twentyfive.

99. Five Trillions Four Hundred and Forty Billions Ninetyfive Millions Six Hundred Thousand and Fortyfour.

100. Forty Trillions Seven Hundred and Fiftysix Billions Nine Hundred Sixtyfive Millions Nine Hundred and Sixty Thousand Four Hundred and Seventytwo.

B. Addition of Simple Numbers.

	1)	2)	3)	4)	5)	6)
Add	2	4	4	3	3	1
	3	3	1	1	2	3
	1	2	2	4	3	2
	1	1	3	2	1	4
	2	3	4	3	4	2
	3	2	1	1	2	1
	—	—	—	—	—	—

7)	8)	9)	10)	11)	12)
3	4	3	3	5	9
4	5	4	3	8	8
5	7	7	9	7	7
2	8	8	9	3	6
6	8	9	9	8	9
7	7	9	8	9	9
—	—	—	—	—	8
					—

13)	14)	15)	16)	17)
10	10	17	24	13
11	12	15	31	41
12	14	14	42	24
10	15	17	13	32
13	11	18	14	13
14	12	19	31	41
—	—	—	—	—

18)	19)	20)	21)	22)
24	42	63	17	24
32	42	21	28	36
13	33	15	46	47
41	22	46	45	58
33	27	53	34	77
22	43	46	56	67

23)	24)	25)	26)	27)
34	96	63	24	34
75	89	21	14	34
57	75	15	13	47
48	68	32	24	45
19	52	46	25	21
28	19	54	32	32
		32	34	41
		61	61	14
			42	25
			45	23
				21

28)	29)	30)	31)	32)
57	341	241	215	245
64	242	423	142	456
79	345	132	434	475
25	423	314	251	365
48	124	142	323	467
82		531	514	389
63				
56				
25	33)	34)	35)	36)
78	351	251	241	243
92	143	134	413	512
84	425	425	324	642
33	214	312	135	345
69	532	143	542	456
52	251	521	354	747
76	143	242	251	645
41	314	415	413	474

37)
253
421
342
198
47
23
459
382
17
4
6
7
14
5

38)
685
527
153
476
554
732
645
816
564
47
19
81
17
5
3

39)
147
458
198
49
32
475
387
475
678
49
147
36
248

40)
465
957
531
318
682
825
744
273
966
352
519
131
427
283
356
798

41)
3125
2531
1452
4213
5344

42)
2514
4352
1435
3124
5459
67124
3125

43)
6475
1424
3247
4532
4932
1758

44)
9676
7803
6175
5740
4531
4756
487
41

45)
3142
2314
4745
4568
8945
643
94
6

46)
4756
4324
413
942
473
48
47
45
37

47)
4745
6745
3487
468
574
653
247
448
321

48)
6746
348
47
6
7
49
45
148
348

49)
3478
8
49
1478
497
48
49
52
163

50)
1692
2583
4375
9708
6037
465
849
256
323
575
475
19
84
66
77
48
99
63
56

51)
4132
342
5243
3151
2435
5314
8521
4152
44
2432
3215
5122
9351
543
3412
5324
7135
4241
475

52)
6745
474
469
1457
456
3675
468
78
49
36
147
65
637
48
49
45
299
47
68
47
68
15
49

53)
32541
41352
24135
13423
54241
35134

54)
47567
4898
7832
4741
456
7457
49437
47324
3672
4517
3127

55)
47845
4741
671
468
758
4734
4734
7854
1467
3473
764
345

56)
52452
43514
24321
35143
13254
41532
52415
31324
15342
14567
34267
76196

57)
68753
86435
75286
92697
23574
57309
21882
39653
92790
13000
50000
56871

58)
85461
79854
8679
64908
47065
26540
35782
91439
287
82506
65798
56
47
487
375

59)
47347
4734
474
49875
43566
67321
4740
3822
473
467
328
900
49
48
32
47
33
29
4
6
7

60)
34789
47414
32432
14750
24327
4723
1475
2347
467
324
145
474
7673
4873
7456
327
468
327
46
47
3214
7456

61)
4
7
47
36
475
368
4747
6549
14327
43832
147324
475325
419876
967345
1009876
2467894
732090
134090

62)
975815
855927
687102
563719
397631
279406
347247
678428
824326
612987
781346
100987

63)
729680
625307
58736
47542
39878
8624
5751
4219
467
34
25
27

64)
896719
758958
421475
89563
76374
4734
9840
8637
782
96
7
14
367
4514
13769
346734

65)
9
48
765
6676
43484
490531
386343
275319
414247
900
457
643
472
587
47
34
9
16275
457326

66)
4748
49875
578746
74327
64743
475748
747324
689423
67499
98878
4976
9376
4894
47467
47789
6543
474
67
9

67)
9878570
765965
427482
529626
46747
1467342
6783289
413246
17617
4346
987
41
9

68)
86572171
9436248
758462
625905
52731
6258
524
76
7
14
134
3567
2714
94
9

69)
4743467
474341
4789328
324137
47329
674
458
732
45214
67325
143475
6732895
1224152
324234
673215

70)
947789456
47983728
49478943
7832457
6743987
494789
374783
47837
474837
498874
578999
47324
4732
414
29
7

71)
10999996000
1099999660
4399
214
414
67

72)
10999892000
1099989200
43999
2199

73)
109998920000
10999892002
1099998
989999
43998
1459

74)
1099972517000
109997251700
43998900
9899752
549989
43998
1099

75)
489999731900000
2099983510
559999634
5599475

76)
489991936000000
209999654
55999907
5599992

77)
489994563414
1647434
1767345
678905
467345
346741
941672

78)
3999195678592
749437944
43469415
4732140
04514
7410
367

79)
19994327542700
4378532600
673260000
563210050
59268750
945005
673215
47324
13275
4132
6734
6490
324
679

80)
47345673894563
1999456734768
598673473217
59463243205
1673445673
432146734
67324732
6737547
694325
41347
6732
475
67
8

---

1)
Add Seven
Ten
Eight
Six
Five
Fourteen
Nineteen
Eighteen.

2)
Add Fourteen
Sixteen
Twentyfive
Twentyfour
Fiftyeight
Sixty
Fifty
Seventyone.

3)
Add One Hundred
Two Hundred
Four Hundred
Ninety
Eighty
Sixty
Seventy
Eightyone
Ninetythree
Fiftythree.

4)
Add Two Hundred and Fifty
Five Hundred and Forty
Three Hundred and Thirty
Six Hundred
Nine Hundred and Sixty
Eight Hundred and Fifty
One Hundred and Twenty
Nine Hundred and four
Six Hundred and nine
Four Hundred and ten.

5)
Add Four Hundred and Twenty
Five Hundred and Fortyfour
Six Hundred and Seven
Eight Hundred
Fortyfour
Sixtyfive
Six Hundred and Fortyeight
Nineteen.

6)
Add Seven Hundred and Sixtynine
Eight Hundred and Eightytwo
Five Hundred and Six
Six Hundred and Forty
Four Hundred and Seventyfive
Seven Hundred and Ninetyfour
Eight Hundred and Fortyfour
Nine Hundred and Sixtytwo.

7)
Add One Thousand
Two Thousand Six Hundred
Three Thousand Four Hundred
Eight Thousand and Fifty
Five Thousand and Nine
Eight Thousand and Eight
Seven Thousand Four Hundred and Forty.

8)
Add Two Thousand Three Hundred and Thirtytwo
Four Thousand Six Hundred and Twentyfive
Three Thousand Two Hundred and Fortyone
Five Hundred and Fortyfour
Six Hundred and Fiftytwo
Eight Hundred and Sixtynine
Eightyeight
Fiftythree.

9)

Add Five Thousand and Thirty
Four Thousand Eight Hundred and Twenty
Six Thousand Four Hundred and Fortytwo
Twentyeight
Fortytwo
Thirtyfour
Eight
Ten
Fourteen
Sixtyeight
Eightynine
Six Hundred and Eightytwo
Two Hundred and Fiftythree
Three Hundred and Fortyeight
Eight Thousand and Thirtythree
Nine Thousand Two Hundred and Ten
One Thousand Two Hundred and Eightyeight
Two Thousand Two Hundred and Eightynine.

10)

Add Fortyfour Thousand Six Hundred and Forty
Twentytwo Thousand Three Hundred and Ninetyeight
Eightythree Thousand Five Hundred and Eighty
Sixty Thousand Four Hundred
Forty Thousand and Sixty
Sixtyeight Thousand Four Hundred
Ninety Thousand and One
Seventytwo Thousand and Forty
Three Thousand and Eighty
Four Thousand Four Hundred and Fortytwo
Five Thousand Six Hundred and Fortyfive
Two Thousand Four Hundred and Seventytwo
Forty Thousand Six Hundred and Forty.
Twenty Thousand Six Hundred and Twenty
Four Thousand Six Hundred and Two.
Nine Thousand Seven Hundred
Eight Hundred and Fiftyone
One Hundred and Sixteen.

11)

Add Fortyfour Thousand and Sixty
Thirtytwo Thousand Six Hundred
Fortyeight Thousand and Twenty
Three Thousand and Fortyfour
Four Thousand Six Hundred and Eighty
Six Thousand Eight Hundred and Forty
Twentyfive
Thirtythree
Eightyeight
Ninetynine
Six
Four
Eight
Fifteen
Eighteen
Twentytwo
Twentythree
Twentyseven.

12)

Add Fifty Thousand and Sixty
Forty Thousand Six Hundred
Twenty Thousand and Six
Fortyeight Thousand
Fiftytwo Thousand and Ninetynine
Sixtythree Thousand Nine Hundred
Eightyeight Thousand Six Hundred and One
Three Thousand and Nine
Four Thousand and Ninety
Seven Thousand and Nine Hundred
Seventyfive Thousand and Sixtytwo
Thirtytwo Thousand Nine Hundred
Eleven Thousand and Ninetyeight
Twelve Thousand
Seven Thousand and Nine
Two Thousand One Hundred and Nine
Three Hundred and Eightythree
Nine Hundred and Nineteen

13)
Add One
Two
Ten
Thirteen
Nineteen
Sixteen
Twentythree
Four Hundred and Seventy
Seven Hundred and Eightytwo
Eight Hundred and Sixtythree
Three Thousand Seven Hundred and Twenty
Four Thousand Six Hundred and Thirtyfive
Seven Thousand Eight Hundred and Eight
Twentyeight Thousand Six Hundred and Eighty
Ninetynine Thousand Eight Hundred and Sixtytwo
Eightyeight Thousand Three Hundred and Fifteen.

14)
Add Six Hundred Thousand Four Hundred and Fiftytwo
Four Hundred Sixtytwo Thousand Four Hundred and Seventytwo
Six Hundred Fortytwo Thousand Four Hundred and Twentytwo
Four Hundred Eightyeight Thousand Six Hundred and Sixtythree
Seven Hundred Sixtyfour Thousand Eight Hundred and Eightythree
Nine Thousand Four Hundred and Forty.

15)
Three Hundred Fortyeight Thousand Two Hundred and Fiftythree
Five Hundred Sixtytwo Thousand Four Hundred and Twentyfive
Seventy Thousand Four Hundred and Forty
Fortytwo Thousand Six Hundred
Nine Thousand Eight Hundred and Eight
Eight Thousand One Hundred and Forty.

16)

Add Two Hundred Fiftytwo Thousand Seven Hundred and Fortyfour
Three Hundred Eightyfour Thousand Eight Hundred and Seventythree
Eight Hundred Eightytwo Thousand Four Hundred and Sixtytwo
Three Hundred Thousand and Forty
Two Hundred Thousand Six Hundred
Five Hundred Thousand and Six
Eight Hundred Sixty Thousand and Sixty
Fortytwo Thousand Six Hundred
Seventythree Thousand two Hundred and Fifty-two
Eighty-three Thousand Four Hundred and Sixty-nine
Twentysix Thousand Three Hundred
Nine Thousand Eight Hundred and Eleven
Twentyseven Thousand and Fifty
One Hundred Thousand.

17)

Add Six Hundred Thousand Four Hundred and Twentyfive
Eight Hundred Eightythree Thousand Eight Hundred and Forty
Three Hundred Fortyeight Thousand One Hundred and Seventyfive
Four Hundred Eightyeight Thousand Three Hundred and Twentythree
Six Hundred Eightyeight Thousand Four Hundred and Eightysix
Eight Hundred Eightyseven Thousand Nine Hundred and Seventyeight
Fortytwo Thousand and Ninety
Seven Thousand and Sixtythree
Eight Thousand and Eightyeight
Twelve Thousand Nine Hundred and Forty
Nine Thousand Two Hundred and Eighteen
Eight Thousand and Ninetytwo
Nine Hundred and Fortytwo
Nine Hundred and Seventytwo
Eight Hundred and Fiftyfive.

18)

Add Five Hundred Thousand Two Hundred
Two Hundred Thousand Three Hundred and Ninetyfive
Nine Hundred Fortytwo Thousand Six Hundred and Fiftytwo
Eight Hundred Eightythree Thousand Two Hundred and Sixtynine
Ten Thousand Four Hundred and Fftyfour
Eight Thousand Two Hundred and Fortyone
Six Thousand Five Hundred and Seventytwo
Nine Thousand Three Hundred and Fortyone
Four Thousand Two Hundred and Fiftyeight
Eight Hundred and Sixtythree
Seven Hundred and Eightytwo
Nine Hundred and Seventythree
Six Hundred and Eightytwo
Ninetyone
Eightythree
Seventytwo
Eight.

19)

Add One Million
One Million Three Hundred Thousand
One Million Twenty Thousand
Three Millions Four Thousand and Twenty
Five Millions Five Hundred and Five
Six Millions Four Hundred Thousand Two Hundred
Seven Millions Eightytwo Thousand and Four

20)

Add Two Millions Four Hundred Seventyfive Thousand Nine Hundred and Fortyfour
Four Millions Six Hundred Seventynine Thousand Three Hundred and Sixtytwo
Five Hundred Thousand and Fortytwo
Three Hundred Thousand Four Hundred and Seventy
Six Thousand Four Hundred and Forty
Eight Thousand Two Hundred and Seventytwo
Four Hundred and Fiftyeight

21)
Add Nine
Twelve
Fourteen
Two Hundred and Forty
Three Hundred and Seventytwo
Six Thousand Four Hundred and Seventyfour
Eight Thousand Two Hundred and Eightytwo
Fortytwo Thousand Six Hundred and Twenty
Sixty Thousand Eight Hundred and Seventyfive
Five Hundred Thousand Two Hundred and Eightytwo
Three Hundred Sixtytwo Thousand Eight Hundred and Fortynine
One Million Three Hundred Eightynine Thousand Four Hundred and Eightyseven
Eight Millions Six Hundred Seventytwo Thousand Nine Hundred and Fortyeight.

22)
Add Twentytwo Millions Four Hundred Thousand
Fortyfour Millions Six Thousand and Eighty
Thirty Millions Four Thousand and One
Five Millions Sixty Thousand and Eightyeight
Three Thousand and Twentyfive
Four Thousand Eight Hundred
Three Thousand and Ninetyfour
Twelve
Fourteen.

23)
Add Twentyfive Millions Forty Thousand Six Hundred and Twentysix
Fortyeight Thousand Five Hundred
Nine Millions Three Thousand and Sixty
Four Hundred Thousand and Fortyfour
Three Thousand Eight Hundred and Ninety
Eighty Millions Two Hundred Thousand
Two Hundred Millions
Eightyfive Thousand Six Hundred and Forty
Ninetytwo Thousand Two Hundred and Four.

24)
Add One Hundred Seventyfour Millions
Twentythree Millions Eight Hundred Thousand
Thirtytwo Millions Nine Hundred and Eight Thousand
Eight Millions Twentyfive Thousand
Seven Millions Fortyeight Thousand
Five Hundred Twentyfour Thousand Three Hundred
Eight Hundred Eightyeight Thousand and Twenty
Seventytwo Thousand Three Hundred and Eightysix
Eightynine Thousand Four Hundred and Fifty
Three Thousand Four Hundred and Ninetyone
Eight Thousand Six Hundred and Ninetyfour
Three Hundred and Eightyeight
Seven Hundred and Eightysix
Eight Hundred and Ninetysix
Fortyseven
Sixtyeight
Three
Eight.

◆

C. *Subtraction of Simple Numbers.*

1) From 8
Subtract 4

2) From 24
Subtract 12

3) From 64
Subtract 34

4) From 984
Take 652

5) From 678
Take 424

6) From 568
Take 246

7) From 542
Take 241

8) From 684
Take 462

9) From 486
Take 346

10) From 426
Take 142

11) From 802
Take 431

12) From 803
Take 547

13) From 700
Take 189

14) From 100
Take 98

15) From 100
Take 9

16) From 100
Take 1

17) From 4862
Take 2622

18) From 3589
Take 2345

19) From 5965
Take 3542

20) From 6898
Take 5452

21) From 2464
Take 1025

22) From 7005
Take 4107

23) From 1000
Take 100

24) From 4000
Take 3989

25) From 8162
Take 4326

26) From 1000
Take 1

27) From 1000
Take 10

28) From 1000
Take 100

29) From 4000
Take 100

30) From 8246
Take 532

31) From 5346
Take 2734

32) From 3406
Take 1244

33) From 6348
Take 826

34) From 72504
Take 24311

35) From 43257
Take 13405

36) From 67258
Take 24422

37) From 72600
Take 37401

38) From 90001
Take 7059

39) From 94350
Take 36146

40) From 60000
Take 18007

41) From 10000
Take 1000

42) From 10000
Take 9090

43) From 10000
Take 1

44) From 40000
Take 3001

45) From 60005
Take 50109

46) From 89716
Take 8717

47) From 69043
Take 4059

48) From 90070
Take 54321

49) From 60801
Take 52002

50) From 839126
Take 397023

51) From 900034
Take 897645

52) From 306578
Take 94006

53) From 354000
Subtract 168989

54) From 306578
Take 94006

55) From 539007
Subtract 9876

56) From 801030
Take 247609

57) From 100000
Subtract 100

58) From 5462249
Subtract 259423

59) From 9853964
Subtract 310648

60) From 6004020
Subtract 1670258

61) From 100000
Subtract 987654

62) From 2634084
Subtract 926132

63) From 1000020
Subtract 659874

64) From 1000000
Subtract 25

65) From 1000000
Subtract 10009

66) From 3406008
Subtract 1578698

67) From 3800087
Subtract 1976899

68) From 7685321
Subtract 89998

69) From 5658740
Subtract 798797

70) From 25102345
Subtract 9687623

71) From 90000003
Subtract 12345678

72) From 37867305
Subtract 259989

73) From 4000500
Subtract 901590

74) From 6743420
Subtract 90139

75) From 7456740
Subtract 707090

76) From 40000000
Take 909

77) From 6007008009
Take 900800700

78) From 6040203050
Take 987654321

79) From 546800009
Take 200098799

80) From 6007008009
Take 900800700

81) From 8002005001
Take 123456789

82) From 120340050680700
Take 30980978765989

83) From 100040704009
Take 90050803214

84) From 300004500007
Take 93001400324

85) From 10004000000
Take 1941320419

86) From 10004000000
Take 945671345

87) From 3045004500
Take 156005946

88) From 64004000346
Take 1075000057

89) From 14732004573
Take 4673204167

90) From 30000000000
Take 197320019

91) From 12303400506807
Take 390809787306

92) From 4673473000000
Take 987345

93) From 1450004703024
Take 1900004015

94) From 140004078091
Take 1234567890

95) From 400300000000
Take 3310030900

96) From 10000000000
Take 10000

97) From 10000000000
Take 400000

98) From 30000500000
Take 29070509 0

99) From 25000400000
Take 15940490105

100) From 10000000000
Take 101900835

101) From 10000000000
Take 399

1) From Twentyfour, take Twelve.
2) From Fortytwo, take Twentyfive.
3) From One Hundred, take Ten.
4) From Two Hundred and Fifty, take Eighty.
5) From Four Hundred and Sixtytwo, take Eightyfive.
6) From One Hundred, take One.
7) From Two Hundred and Sixtyfour, take One Hundred and Eightythree.
8) From One Thousand Four Hundred and Fifty, take Three Hundred and Seventyfive.
9) From Three Thousand Four Hundred and Fifty, subtract One Thousand and Seventyfive.
10) From Twenty Thousand, subtract Fifteen Thousand Four Hundred and Eightynine.
11) From Forty Thousand, take Twelve Hundred and Fortyeight.
12) From Fiftytwo Thousand Eight Hundred, take One Thousand One Hundred and Fourteen.
13) From Twentyfive Thousand, subtract Twentyfive
14) From Twenty Thousand One Hundred and Sixtytwo, subtract Eighteen Thousand Three Hundred and Sixtyfour.
15) From Ninety Thousand and Fifty, subtract Eight Thousand Four Hundred and Fortyeight.
16) From One Hundred Thousand Four Hundred and Fiftyfive, take Two Thousand Four Hundred and Seventytwo.
17) From Twentytwo Thousand Two Hundred, subtract One Hundred and Five.
18) From Two Hundred Fortyeight Thousand Two Hundred, subtract Ninetyfive Thousand Six Hundred and Fortytwo.

19) From One Hundred Thousand One Hundred, take Twentyfive Thousand Six Hundred.

20) From Five Hundred Thousand and Fifty, take Fiftytwo Thousand Eight Hundred and Fortyeight.

21) From Four Hundred Thousand Two Hundred and Forty, take Ninetytwo Thousand Six Hundred and Thirtynine.

22) From One Hundred Thousand, take One Thousand and Fifty.

23) From One Million, take Five.

24) From Two Millions Two Thousand Three Hundred, take Nine Hundred Thousand and Ninety.

25) From Twenty Millions Four Hundred Thousand, take Eighteen Millions Fiftytwo Thousand Two Hundred and Five.

26) From Ten Millions Ten Thousand and Ten, subtract One Million One Thousand and One.

27) From Ten Millions, take One Hundred Twentythree Thousand Four Hundred and Fiftysix.

28) From Ten Millions Two Thousand Five Hundred, take Fortytwo Thousand and Forty.

29) From Twentyfive Thousand Five Hundred, subtract Twentyfour Thousand Four Hundred and Ninetynine.

30) From Two Millions Forty Thousand, take One Million Thirtynine Thousand Five Hundred and Eighty.

D. Multiplication of Simple Numbers.

1) Multiply 43
by 2

2) Multiply 49
by 3

3) Multiply 39
by 7

4) Multiply 213
by 5

5) Multiply 415
by 6

6) Multiply 348
by 7

7) Multiply 4134
by 3

8) Multiply 674
by 8

9) Multiply 6743
by 6

10) Multiply 1253
by 9

11) Multiply 3487
by 8

12) Multiply 6789
by 9

13) Multiply 45709
by 7

14) Multiply 42032
by 5

15) Multiply 60009
by 9

16) Multiply 600905
by 9

17) Multiply 609030
by 10

18) Multiply 300900
by 40*

19) Multiply 9287429
by 3

20) Multiply 3478909
by 9

21) Multiply 3467890
by 70

22) Multiply 3674567
by 80

23) Multiply 345000
by 100

24) Multiply 39807000
by 1000

25) Multiply 69700000
by 4000

26) Multiply 67450000
by 6000

27) Multiply 34570050
by 6000

28) Multiply 85732000
by 7000

29) Multiply 928720314†
by 24

30) Multiply 48075343
by 25

31) Multiply 34374670
by 36

32) Multiply 69500506
by 56

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* Multiply by 4, and add a cipher to the product.

† Multiply first by 6, and then this product again by 4.

33) Multiply 60067434
by 49

34) Multiply 64500075
by 28

35) Multiply 54632047
by 32

36) Multiply 67854307
by 18

37) Multiply 47320567
by 21

38) Multiply 45734678
by 42

39) Multiply 67346780
by 48

40) Multiply 45007608
by 64

41) Multiply 34102564
by 17

42) Multiply 60543270
by 13

43) Multiply 6740560
by 19

44) Multiply 69300589
by 23

45) Multiply 34775000
by 29

46) Multiply 32017456
by 31

47) Multiply 67432107
by 37

48) Multiply 16737779
by 39

49) Multiply 2354267
by 630

50) Multiply 42536042
by 780

51) Multiply 6473445
by 450

52) Multiply 46473890
by 240

53) Multiply 75700000
by 180

54) Multiply 77892400
by 360

55) Multiply 97467300
by 730

56) Multiply 56947000
by 4700

57) Multiply 80674
by 234

58) Multiply 754320
by 345

59) Multiply 23546035
by 3760

60) Multiply 4687257
by 5670

61) Multiply 5346823
by 85300

62) Multiply 463573
by 942000

63) Multiply 8067
by 4679

64) Multiply 9487
by 8903

65) Multiply 37980
by 65790

66) Multiply 453210
by 304

67) Multiply 4635736
by 942000

68) Multiply 7490574
by 8005

69) Multiply 567
by 7650000

70) Multiply 9070005
by 809070

71) Multiply 950057
by 45321

72) Multiply 79236
by 400740

73) Multiply 79236
by 400740

74) Multiply 6005430
by 50004

75) Multiply 4750067
by 10906

76) Multiply 7324000
by 14005

77) Multiply 632451
by 50024

78) Multiply 677889
by 40050

79) Multiply 337745
by 3009

80) Multiply 45349
by 43756

81) Multiply 90700007
by 80900700

82) Multiply 547666
by 3457000

83) Multiply 712000405
by 6708900

84) Multiply 476
by 374000

85) Multiply 90407
by 3045000

86) Multiply 4732
by 67500

87) Multiply 750054
by 7896000

88) Multiply 4734
by 6738000

89) Multiply 7120034
by 4907000

90) Multiply 73745
by 347000

91) Multiply 40034
by 6007500

92) Multiply 409785
by 300409

93) Multiply 6999915
by 7000346

94) Multiply 69991151
by 70018828

95) Multiply 69783058
by 17049741

96) Multiply 1099996
by 1100004

97) Multiply 10990453
by 10151949

98) Multiply 1113973
by 1074607

99) Multiply 11139738
by 10746076

100) Multiply 7498942
by 5623413

1) Three times Twentyfive, are how many?
2) Twenty times Fortyseven, are how many?
3) Fifty times Fiftysix, are how many?
4) One Hundred times Fortyeight, are how many?
5) Two Hundred times Seventyfive, are how many?

6) Take Eightyseven, Three Thousand times.
7) Take Five Hundred and Thirtyfour, Twelve times.
8) Take Six Hundred and Fortyfour, Fourteen times.
9) Take Four Hundred and Eightyseven, Sixteen times.
10) Twentyseven times Two Thousand Four Hundred and Eightythree, are how many?
11) Take Six Thousand Eight Hundred and Forty, Eightyone times.
12) What is the product of Seven Thousand and Fiftytwo, by Two Hundred and Forty?
13) What is the product of Five Thousand Two Hundred and Fifty, by Four Hundred and Twenty?
14) What is the product of Six Thousand Seven Hundred and Seventy, by Three Hundred and Fortytwo?
15) What is the product of Fortytwo Thousand Six Hundred and Fiftyfour, by Nine Hundred and Sixtyone?
16) What is the product of Seventy Thousand Seven Hundred and Seven, by Nine Thousand One Hundred?
17) What is the product of Fortyeight Thousand Six Hundred and Fortythree, by Four Thousand and Sixtyfour?
18) Forty Thousand times Twenty Thousand, are how many?
19) Fortyeight Thousand times Five Thousand Six Hundred, are how many?
20) What is the product of Fortytwo Thousand Six Hundred, by Five Thousand Six Hundred and Forty?
21) What is the product of Fortyfour Thousand, by Twentyfive Thousand Six Hundred and Forty?
22) What is the product of Seventyeight Thousand Six Hundred and Twentythree, by Forty Eight Thousand Eight Hundred and Fifty?
23) One Hundred Thousand times Fifty Thousand and Eighty, are how many?
24) Two Hundred and Eighty Thousand times Forty Thousand Eight Hundred, are how many?
25) Multiply One Hundred Thousand, by One Hundred Thousand.

26) Multiply One Hundred Thousand, by Ten Thousand.

27) Multiply Three Hundred Thousand, by Sixtyfour Thousand and Eighty.

28) Multiply Sixtythree Thousand Eight Hundred, by Twentyfour Thousand and Fiftyfour.

29) Multiply Four Hundred Thousand and Four Hundred, by Six Hundred Thousand and Six Hundred.

30) Multiply One Million Fifty Thousand and Fifty, by Three Hundred Thousand and Forty.

31) Multiply Five Millions Four Hundred Seventytwo Thousand Six Hundred and Fortyeight, by Three Hundred and Seventytwo Thousand.

32) Multiply Ten Millions, by Ten.

33) Multiply Ten Millions, by One Hundred.

34) Multiply Forty Millions, by One Thousand.

35) Multiply One Hundred Thousand, by One Thousand.

36) Multiply One Million, by One Million.

37) Multiply One Thousand, by One Thousand.

38) Multiply Ten Thousand, by Ten Thousand.

39) Multiply Five Millions Fortytwo Thousand and Sixtyeight, by Thirty Thousand Nine Hundred and Two.

40) Multiply Ten Millions Two Hundred Fortyeight Thousand Five Hundred and Sixty, by Ten Thousand Nine Hundred and Ninetyeight.

41) Multiply Fiftyseven Millions Four Hundred Seventy Thousand Six Hundred, by Ten Thousand Eight Hundred and Fortynine.

42) Multiply Three Hundred and Eightyfour, by Seven Millions Four Hundred and Sixty Thousand.

43) Multiply Twentyfour Thousand Six Hundred, by Four Millions and Eighty Thousand.

44) Multiply Eight Millions Fortytwo Thousand Eight Hundred, by Fortyeight Thousand Six Hundred and Ninety.

45) Multiply Fortyfive Thousand, by Fortyfive Thousand.

46) Multiply Three Millions, by Thirty Thousand.

47) Multiply Seven Millions Seven Thousand and Seventy, by Thirtyfive Thousand and Thirtyfive.

48) Multiply Four Millions Six Hundred Eightytwo Thousand Four Hundred and Sixtytwo, by Four Hundred Sixtyseven Thousand Seven Hundred and Eightyfive.

E. Division of Simple Numbers.

1) Divide 2 into 68; or, which is the same, 68 by 2.
2) Divide 3 into 36; or, " " 36 by 3.
3) Divide 48 by 3.
4) Divide 320 by 2.
5) Divide 440 by 5.
6) Divide 560 by 5.
7) Divide 45943 by 9.
8) Divide 37840 by 7.
9) Divide 48734 by 8.
10) Divide 43100 by 6.
11) Divide 31025 by 5.
12) Divide 470003 by 7.
13) Divide 367009 by 9.
14) Divide 600745 by 9.
15) Divide 304127 by 8.
16) Divide 410034 by 7.
17) Divide 412410 by 6.
18) Divide 4767894 by 9.
19) Divide 13705213 by 9.
20) Divide 241346734 by 7.
21) Divide 360 by 10.
22) Divide 480 by 12.
23) Divide 4800 by 12.
24) Divide 66600 by 9.
25) Divide 1460 by 4.
26) Divide 7480 by 8.
27) Divide 6805 by 5.
28) Divide 6000 by 100.
29) Divide 1000 by 1000.
30) Divide 10000 by 1000.
31) Divide 10000 by 100.
32) Divide 4800 by 10.
33) Divide 10000 by 50.
34) Divide 3000 by 300.
35) Divide 40000 by 80.
36) Divide 2800 by 70.
37) Divide 8460 by 4.
38) Divide 136527 by 17.
39) Divide 25530 by 5.
40) Divide 9897660 by 13.
41) Divide 977670 by 6.
42) Divide 133076 by 19.
43) Divide 450763 by 7.
44) Divide 130020 by 20.
45) Divide 54592 by 8.
46) Divide 16989 by 21.
47) Divide 315207 by 9.
48) Divide 155188 by 22.
49) Divide 920790 by 10.
50) Divide 214107 by 23.

51) Divide 498971 by 11.
52) Divide 21528 by 24.
53) Divide 118224 by 12.
54) Divide 27225 by 25.
55) Divide 52078 by 13.
56) Divide 235924 by 26.
57) Divide 126994 by 14.
58) Divide 162216 by 27.
59) Divide 109860 by 15.
60) Divide 1960196 by 28.
61) Divide 89792 by 16.
62) Divide 232261 by 29.
63) Divide 177120 by 30.
64) Divide 86469 by 41.
65) Divide 203320 by 52.
66) Divide 380457 by 63.
67) Divide 682058 by 74.
68) Divide 85680 by 85.
69) Divide 874272 by 96.
70) Divide 54360 by 45.
71) Divide 421142 by 59.
72) Divide 269990 by 38.
73) Divide 424081 by 47.
74) Divide 88582 by 69.
75) Divide 174431 by 29.
76) Divide 266487 by 38.
77) Divide 4324368 by 47.
78) Divide 4037817 by 56
79) Divide 2829196 by 69.
80) Divide 59438100096 by 64.
81) Divide 30950900280 by 54.
82) Divide 62596017055 by 65.
83) Divide 14026028296 by 56.
84) Divide 41520338772 by 76.
85) Divide 22848718416 by 67.
86) Divide 205867975968 by 68.
87) Divide 27047459660 by 52.
88) Divide 16353072425 by 25.
89) Divide 331781132280 by 630.
90) Divide 3314834560 by 450.
91) Divide 1481005460 by 780.
92) Divide 2056074530 by 368.
93) Divide 45674300 by 4500.
94) Divide 7246350 by 790.
95) Divide 34672000 by 6900.
96) Divide 74341200 by 3650.
97) Divide 346731056 by 459.
98) Divide 34100586 by 368.
99) Divide 10042586 by 475.

100) Divide 34673200 by 367.
101) Divide 103467345 by 285.
102) Divide 10043746 by 689.
103) Divide 14174068 by 149.
104) Divide 3468700 by 256.
105) Divide 7400050 by 189.
106) Divide 3004150 by 2780.
107) Divide 1490000 by 3890.
108) Divide 1347437 by 1450.
109) Divide 1203496 by 1190.
110) Divide 3069045 by 2060.
111) Divide 3045600 by 4070.
112) Divide 1405000 by 5080.
113) Divide 2503400 by 4760.
114) Divide 88830930 by 3760.
115) Divide 26998605 by 5760.
116) Divide 17432706 by 3470.
117) Divide 28894373 by 45700.
118) Divide 4560840000 by 85300.
119) Divide 46368633937 by 94200.
120) Divide 743467456 by 7908.
121) Divide 482941148 by 60083.
122) Divide 4456921858 by 4793.
123) Divide 147325006 by 2314.
124) Divide 246003456 by 4516.
125) Divide 246748345 by 7006.
126) Divide 146732856 by 8007.
127) Divide 1452343105 by 9054.
128) Divide 387432000 by 1096.
129) Divide 48008320 by 3045.
130) Divide 748324567 by 42005.
131) Divide 134567000 by 34721.
132) Divide 1470000830 by 14007.
133) Divide 134678945 by 14075.
134) Divide 324253789 by 40507.

135) Divide 123456789 by 60400.
136) Divide 987654321 by 34700.
137) Divide 10263040 by 69450.
138) Divide 50607080 by 14536.
139) Divide 446078390 by 32750.
140) Divide 340042102 by 75304.
141) Divide 3456007434 by 69476.
142) Divide 244420236 by 10950.
143) Divide 1778899000 by 20747.
144) Divide 2467432400 by 63475.
145) Divide 2400045670 by 24001.
146) Divide 1122334768 by 11224.
147) Divide 685345768 by 68536.
148) Divide 3240005300 by 19487.
149) Divide 145745600 by 26730.
150) Divide 4567437400 by 45740.
151) Divide 4700567434 by 76830.
152) Divide 7300428756 by 37900.
153) Divide 2304567246 by 456000.
154) Divide 3475672457 by 123000.
155) Divide 6347206032 by 123640.
156) Divide 1234172000 by 376500.
157) Divide 2432413450 by 456730.
158) Divide 1003456720 by 492780.
159) Divide 2002431023 by 673270.
160) Divide 1003475203 by 134560.
161) Divide 2020346730 by 627460.
162) Divide 1734672456 by 707080.
163) Divide 6732416734 by 809030.
164) Divide 1340034000 by 400567.
165) Divide 273456700 by 670045.
166) Divide 345720045 by 390007.
167) Divide 102000467 by 407456.
168) Divide 100000000 by 100906.
169) Divide 100000000 by 394674.

170) Divide 300004000 by 294673.
171) Divide 4003050090 by 914005.
172) Divide 340000000 by 339999.
173) Divide 457000000 by 456000.
174) Divide 572103405 by 547347.
175) Divide 673245678 by 662346.
176) Divide 345627483 by 743406.
177) Divide 178324572 by 169475.
178) Divide 692457087 by 673004.
179) Divide 274523418 by 100995.
180) Divide 347788990 by 200047.
181) Divide 155324160 by 304767.
182) Divide 4900000003499851 by 700000388.
183) Divide 4899999465199553 by 700000388.
184) Divide 12 00000945999 by 110000019.
185) Divide 1209999764599 by 110000019.
186) Divide 1209999103499 by 110000019.
187) Divide 1210000428998 by 110000139.
188) Divide 1210024262438 by 110004954.
189) Divide 1210108992806 by 110012712.
190) Divide 1240937758485 by 107460783.
191) Divide 5232991138046 by 697803584.
192) Divide 1347674320005 by 294367283.
193) Divide 2467326741005 by 382983210.

1) Divide Fortyfive by Three.
2) How many times are 5 contained in 100?
3) How many times can you take 6 out of 3600?
4) How many times are 10 contained in 100?
5) How many times are 30 contained in 450?
6) How many times are 12 contained in 14400?
7) How many times are 14 contained in 9800?
8) How many times are 18 contained in 19800?
9) How many times are 24 contained in 28800?

10) How many times are 35 contained in 95200?
11) How often can you take 45 out of 19265?
12) How often can you take 62 out of 34410?
13) What is the 42d part of 152922?
14) What is the 75th part of 328536?
15) What is the 105th part of 394770?
16) What is the 125th part of 8486250?
17) What is the 625th part of 2138125?
18) What is the 1346th part of 7195716?
19) What is the 1000th part of 1000000?
20) What is the 10000th part of 1000000?
21) What is the 100000th part of 1000000?
22) What is 1000000th part of 1000000?
23) Take one tenth of 1000.
24) What is the 10th part of 10000?
25) What is the 100th part of 100000?
26) How many times are 100 contained in 1000?
27) How many times can you take 100 from 100000
28) How many times are 234 contained in 1067040?
29) How many times are 456 contained in 562704?
30) How many times are 375 contained in 465000?
31) How many times are 483 contained in 4564350?
32) How many times are 785 contained in 3873190?
33) How many times are 2130 contained in 2076750?
34) How many times are 4150 contained in 27946100?
35) How many times are 6743 contained in 16560808?
36) How many times are 7483 contained in 9234022?
37) How many times are 1923 contained in 6346745?
38) How many times are 4678 contained in 67345000?
39) How many times are 6713 contained in 34672?
40) How many times are 7416 contained in 1000?
41) How many times are 8132 contained in 100000?
42) How many times are 9132 contained in 1000000?
43) How many times are 4569 contained in 10000000?

44) How many times are 1000 contained in 40000?
45) How many times are 5000 contained in 35480?
46) How often are 3457 contained in 4730000?
47) How often are 1007 contained in 375000?
48) How often are 300094 contained in 10000000?
49) How often are 374946 contained in 600300?
50) What is the 45745th part of 7400000?
51) What is the 327595th part of 36700000?
52) What is the 398700th part of 7999997?
53) What is the 4767343d part of 100000000?
54) What is the 3457614th part of 100000000?
55) What is the 7534325th part of 360350000?
56) What is the 888th part of 887340330?
57) What is the 999th part of 100000000?
58) What is the 7777th part of 300000000?
59) What is the 2929th part of 250000000?

SECTION II.

REDUCTION, ADDITION, SUBTRACTION, MULTIPLICATION AND DIVISION OF COMPOUND NUMBERS.

Table of Reduction.

FEDERAL MONEY.

10 Mills	make	1 Cent.
10 Cents	make	1 Dime.
10 Dimes, or 100 Cents,	make	1 Dollar.
10 Dollars	make	1 Eagle.
5 Dollars	make	1 half Eagle.
2 and one half Dollars	make	one quarter Eagle.

ENGLISH MONEY.

4 Farthings	make	1 Penny.
12 Pence	"	1 Shilling.
20 Shillings	"	1 Pound.
21 Shillings	"	1 Guinea.

TROY WEIGHT.

24 Grains - - make - - 1 Pennyweight.
20 Pennyweights - " - - 1 Ounce.
12 Ounces - - " - 1 Pound.

[By this weight gold, silver and jewels are weighed.]

AVOIRDUPOIS WEIGHT.

16 Drams - - - make - - 1 Ounce.
16 Ounces - - " - - 1 Pound.
28 Pounds - - - " - 1 Quarter.
4 Quarters - - " - - 1 Hundred weight.
20 Hundred weight " - 1 Ton.

[By this weight are weighed all commodities which are coarse, and subject to waste; as well as all metals, except gold, silver and platinum.]

APOTHECARIES' WEIGHT.

20 Grains - - make - - 1 Scruple.
3 Scruples - - " - - - 1 Dram.
8 Drams - - " - - 1 Ounce.
12 Ounces - - " - - - 1 Pound.

[This weight is used by apothecaries in compounding medicines; but they buy and sell drugs by avoirdupois weight.]

CLOTH MEASURE.

4 Nails - - make - - 1 Quarter.
4 Quarters - - " - - 1 Yard.
3 Quarters - - " - 1 Ell Flemish.
5 Quarters - - " - - 1 Ell English.
5 Quarters - - " - 1 Ell (aune) French.

LONG MEASURE.

3 Barley Corns - make - 1 Inch.
12 Inches - - - " - 1 Foot.
3 Feet - - - " - 1 Yard.
5½ Yards, or 16½ Feet " - - 1 Pole, Rod or Perch.
40 Poles, or 220 Yards " - 1 Furlong.
8 Furlongs - - " - - 1 Mile.
3 Miles - - - " - 1 League
60 Geographical Miles } " - - 1 Degree.
69½ *Statute Miles* }

LAND OR SQUARE MEASURE.

144	Square Inches	make	1	Square	Foot.
9	“ Feet	“	1	“	Yard.
30¼	“ Yds. or	“	1	“	Rod, Pole, or Perch.
272¼	“ Feet				
40	“ Rods	“	1	“	Rood.
4	“ Roods	“	1	“	Acre.
640	Acres, or	“	1	“	Mile.
3097600	Square Yards				

WINE MEASURE.

2	Pints	make	1 Quart.
4	Quarts	“	1 Gallon.
63	Gallons	“	1 Hogshead.
2	Hogsheads	“	1 Pipe or Butt.
2	Pipes or 4 Hogsheads	“	1 Tun.

ALE AND BEER MEASURE.

2	Pints	make	1 Quart.
4	Quarts	“	1 Gallon.
36	Gallons	“	1 Barrel.
54	Gallons	“	1 Hogshead of beer.
3	Barrels	“	1 Butt.

CUBIC OR SOLID MEASURE.

1728	Cubic Inches	make	1 Cubic Foot.
27	“ Feet	“	1 “ Yard.
40	Ft. of round timber, or		1 Ton or load.
50	Ft. of hewn timber		
16	Cubic or Solid Feet	make	1 Foot of cord-wood meas.
128	“ Feet	“	1 Cord of wood.

NOTE.—A Cord of Wood is 8 feet long, 4 feet high, and 4 feet deep.

DRY MEASURE.

2	Pints	make	1 Quart.
4	Quarts	“	1 Gallon.
2	Gallons	“	1 Peck.
4	Pecks	“	1 Bushel.
8	Bushels	“	1 Quarter.
36	Bushels	“	1 Chaldron.
5	*Quarters*	“	1 Wey.
2	*Weys*	“	1 Last.

TIME MEASURE.

60 Seconds	make	1 Minute.
60 Minutes	"	1 Hour.
24 Hours	"	1 Day.
365 Days	"	1 Year.
100 Years	"	1 Century.
	Also,	
7 Days	make	1 Week.
4 Weeks	"	1 Month.
13 Months, 1 Day, 6 Hours		1 Julian Year.
12 Calendar Months,	"	1 Year.

NOTE.—Properly speaking, the year has 365 days, 5 hours, 48 minutes and 57 seconds; but, for common business, it is sufficient to call the year 365 days.

A. REDUCTION

is either descending or ascending.

Descending Reduction is when numbers of a higher denomination are reduced to a lower.

Ascending Reduction is when numbers of a lower denomination are changed into a higher denomination.

RULE. When the Reduction is Descending, then multiply the highest denomination by that number which indicates how many units of the next lower denomination are contained in a unit of the highest, and add to the product the parts of the same name; and so on.

When the Reduction is Ascending, then divide the given number of the lowest denomination by that number which shows how many units of that denomination make one of the next higher; and so on to the highest denomination wanted. The last quotient, and the several remainders, constitute the answer.

Federal Money.

1) Reduce 4 Dollars to Cents.

2) Reduce 5 Dollars to Mills.

3) Reduce 13 Dollars to Mills.

	£.	s.	d.	f.
29) How many Pence are there in	47	19	00	0?
30) How many Pence are there in	145	18	3	?
31) How many Pence are there in	275	10	9	?
32) How many Farthings are there in	5	17	6	?
33) How many Pence are there in	17		19	?
34) How many Farthings are there in	174	17	9	3?
35) What number of Pence is there in	45	19		?
36) What number of Farthings are there in	74		10	3?
37) What number of Shillings in £5000?				
38) What number of Farthings in £3000?				
39) What number of Farthings in	575	19	9	3?
40) What number of Pence are there in	473	17	9	2?

41) How many Pence are there in 450 Farthings?

42) How many Shillings are there in 1200 Pence?

43) How many Pounds are there in 1000 Shillings?

44) How many Shillings and Pence are there in 1400 Pence?

45) How many Shillings and Pence are there in 4500 Farthings?

46) How many Pounds, Shillings, Pence and Farthings are there in 2745 Farthings?

47) Convert £75 17*s.* 9*d.* 3*f.* to Farthings.

48) Convert 441788 Farthings to Pounds, Shillings and Pence.

49) Convert 47450 Farthings into Pounds, Shillings and Pence?

50) Convert 37480 Pence to Pounds and Shillings.

51) In 43520 Farthings, how many Pounds, Shillings and Pence?

52) What is the equivalent in Pounds and Shillings to 54340 Pence?

53) What is the equivalent in Pounds, Shillings and Pence to 14520 Farthings?

54) What is the equivalent in Farthings to £17 17*s.* 9*d.*?

55) Change £475 to Shillings.

56) Change £15 9*d.* to Pence.

57) Change £475 to Farthings.

58) Find the number of Pounds, Shillings and Pence contained in 37900 Farthings.

59) Find the number of Farthings equal to 43320 Pounds?

60) Find the number of Pounds, Shillings and Pence equal to 875000 Farthings.

Troy Weight.

1) Reduce 19 Pennyweights to Grains.

2) Reduce 5 Ounces to Pennyweights.

3) Reduce 9 Pounds to Pennyweights.

4) How many Pennyweights are 14 lbs.?

5) How many Grains are there in 3 lbs. 5 oz.?

6) How many Grains are there in 2 lbs. 2 oz. 3 pwt.?

7) How many Pennyweights are in 17 lbs.?

8) What is the equivalent in Grains to 4 lbs. 5 pwt.?

9) What is the equivalent in Pennyweights of 14 lbs. 10 ounces?

10) How many lbs. are there in 47 Ounces?

11) How many pwts. are there in 140 Grains?

12) How many Ounces and Pennyweights are there in 200 Grains?

13) How many lbs., oz. and pwts. are there in 1474 Grains?

14) What is the equivalent in lbs., oz. and pwts. to 475 Grains?

15) What is the equivalent in lbs., oz. and pwts. to 4500 pwts.?

16) How many lbs., oz. and pwts. are equal to 4754 pwts.?

17) Find the number of lbs., oz. and pwts. contained in 9175 pwts.?

18) Find the number of pwts. equal to 12 lbs. 9 pwts.

19) Find the number of Grains equal to 5 lbs. 19 gr.

20) Find the number of Pounds, Ounces and Pennyweights contained in 1400 Grains.

Avoirdupois Weight.

1) Reduce 9 Ounces to Drams.

2) *Reduce 5* Pounds to Ounces.

3) Reduce 3 quarters to pounds.
4) Reduce 9 hundred weight to quarters.
5) Reduce 17 tons to hundred weight.
6) Reduce 2 quarters to drams.
7) Reduce 9 cwt. to ounces.
8) Reduce 5 tons to pounds.
9) Reduce 3 quarters to drams.
10) Reduce 19 cwt. to drams.
11) Reduce 40 tons to ounces.
12) Reduce 2 tons to drams.
13) How many pounds are in 3 cwt. 2 qrs.
14) How many pounds are in 17 tons?
15) How many pounds are in 17 tons 17 cwt.?
16) How many ounces are there in 3 tons 11 cwt. 2 qrs.

	T.	*cwt.*	*qrs.*	*lbs.*	*oz.*
17) How many drams are there in -	14	9	3	00	0?
18) How many drams are there in - -	3	5		19	?
19) How many drams are there in - -		3		14	9?

20) How many drams are equal to 2 cwt. 2 qrs. 19 lbs.?
21) How many ounces are equal to 19 tons, 2 qrs. 17 lbs.?
22) How many drams are equal to 14 tons, 2 cwt. 19 lbs. 5 ounces?
23) How many drams are equal to 5 tons 7 ounces?
24) What is the equivalent in pounds to 14 tons 17 cwt.?
25) What number of ounces is equivalent to 9 tons 3 qrs. 15 ounces?
26) What number of drams is equivalent to 14 tons?
27) How many ounces are there in 440 drams?
28) How many pounds are there in 440 ounces?
29) How many pounds and ounces are there in 440 drams?
30) How many qrs. and lbs. are there in 1320 drams?
31) How many cwt. qrs. and lbs. are there in 9400 ounces?
32) Find the number of cwt. qrs. and lbs. contained in 47000 ounces.
33) Find the number of cwt. qrs. lbs. and ounces contained *in 35000* ounces?

34) What number of cwt. qrs. lbs. and ounces is equivalent to 94000 ounces?
35) What number of tons, cwt. qrs. lbs. ounces and drams, are equivalent to 179900 drams?
36) What number of tons, cwt. qrs. lbs. ounces and drams, are equivalent to 1000000 drams?
37) Change 14000 lbs. into cwts?
38) Change 17980 lbs. into tons.
39) Change 14944 ounces to cwts. and tons.
40) Change 947349 drams into cwts.
41) Convert 4799 lbs. to quarters.
42) Convert 9975 lbs. to cwts. and qrs.
43) Convert 1493400 ounces to tons, cwts. qrs. and lbs.
44) Change 40 tons into lbs.
45) Change 49 tons 5 cwt. into ounces.
46) Change 3 tons 17 cwt. 2 qrs. to ounces.
47) Change 17 tons 19 cwt. 3 lbs. to drams.
48) Change 19754 drams to cwts. qrs., &c.
49) In 148000 drams, how many cwt. qrs. lbs. and ounces?
50) In 9 tons, 7 lbs. 3 drams, how many drams?

Apothecaries' Weight.

1) Reduce 2 scruples to grains.
2) Reduce 7 drams to scruples.
3) Reduce 10 ounces to drams.
4) Reduce 5 lbs. to ounces.
5) Change 6 drams into grains.
6) Change 9 ounces into scruples.
7) Change 5 lbs. into drams.
8) Change 11 ounces into grains.
9) Change 5 lbs. 3 drams into grains.
10) How many grains are there in 14 lbs. 2 oz.
11) How many scruples are there in 9 lbs.?
12) How many drams are equivalent to 14 lbs. 9 oz.?
13) How many grains are equivalent to 9 oz. 3 sc. 2 gr.?

14) How many scruples are equivalent to 4 lbs. 7 ounces?
15) Convert 140 grains to scruples.
16) Convert 250 scruples into drams and ounces.
17) Convert 25000 grains into scruples, drams, ounces and pounds.
18) How many pounds, ounces and drams are contained in 14000 grains?
19) What number of pounds, ounces and drams are equivalent to 20000 scruples?
20) Find the number of ounces, drams and scruples equal to 1400 grains.

Cloth Measure.

1) How many nails are there in 3 quarters?
2) How many nails are there in 1 yard?
3) How many nails are there in 1 ell Flemish?
4) How many nails are there in an ell English?
5) Change 15 ells French into nails?
6) Change 14 ells 3 quarters English into nails.
7) Reduce 14 ells Flemish to quarters.
8) Reduce 29 ells English to quarters.
9) Convert 45 English ells to ells Flemish.*
10) Convert 35 Flemish ells into English.†
11) How many ells Flemish are there in 140 quarters?
12) How many ells English are there in 200 quarters?
13) How many yards are there in 1500 nails?
14) How many yards, quarters and nails are equivalent to 3500 nails?
15) Change 400 ells Flemish into English or French.
16) Change 1000 nails into ells Flemish.
17) Convert 1960 quarters into yards.
18) What number of yards is equal to 1900 nails?
19) In 1475 nails, how many quarters?
20) In 140 yards 3 quarters 2 nails, how many nails?

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* Multiply 45 by 5, and divide the answer by 3.

† Multiply 35 by 3, and divide the answer by 5.

Long Measure.

1) How many barley corns are there in 9 inches?
2) How many inches are there in 11 feet?
3) How many feet are there in 12 yards?
4) How many yards are there in 19 poles?
5) How many feet are there in 19 poles?
6) How many poles are there in 5 furlongs?
7) Change 190 furlongs into miles.
8) How many geographical miles are there in 6 degrees?
9) How many statute miles are there in 6 degrees?
10) How many miles are there in 12 leagues?
11) Convert 12 yards into inches.
12) Change 7 yards 3 inches into barley corns.
13) Change 5 yards 2 feet into inches.
14) Reduce 7 furlongs to yards.
15) Reduce 6 furlongs 29 poles to yards.
16) Reduce 2 miles 7 furlongs to yards.
17) In 5 miles are how many yards?
18) In 13 miles 2 furlongs are how many poles?
19) In 9 miles 6 poles are how many feet?
20) In 37 poles are how many barley corns?
21) In 5 degrees, how many poles?
22) In 13 degrees, how many yards?
23) In 140 barley corns, how many inches and feet?
24) In 200 inches, how many feet and yards?
25) In 5000000 inches, how many miles?
26) How many degrees are equivalent to 4500000 feet?
27) How many furlongs, poles and yards are there in 45000 feet?
28) How many miles, furlongs, poles, yards and feet are there in 10000000 inches?
29) Change 45000 feet to yards, poles and furlongs.
30) Change 45000 yards to poles, furlongs and miles.
31) Convert 40000 poles to miles and furlongs.
32) Convert 30000 furlongs to geographical degrees.

Square Measure.

1) How many square inches are there in 2 square feet?
2) How many square inches are there in 1 square yard?
3) How many square feet are there in 10 square yards?
4) How many square yards are there in 12 square rods?
5) How many square rods are there in 5 square roods?
6) How many square roods in 12 acres?
7) How many acres in 12 square miles?
8) Change 5 acres into square yards.
9) Convert 3 acres 25 square rods into square feet.
10) Convert 15 acres 3 square roods into square inches.
11) How many square feet are equivalent to 1 square mile?
12) How many square feet are equivalent to 2 square miles 20 acres 3 square roods[*] 25 square rods?
13) How many square inches are equivalent to 40 square miles 35 acres 17 square rods and 2 square feet?
14) Change 14400 square inches to square feet.
15) Change 3450 square feet into square yards.
16) Change 39491 square yards to square rods.[†]
17) Change 34341 square feet to square rods.
18) Change 5800 square rods to square roods.
19) Change 4570 square roods into acres.
20) Change 49734 acres into square miles.
21) Change 34799 square yards to rods, roods and acres.
22) Change 3210000 sq. feet to yards, rods, roods and acres.
23) How many square miles, acres, roods, rods and yards are there in 120000000 feet?
24) How many square miles, acres, roods, rods, yards and feet are there in 8500000000 square inches?
25) What number of square miles, acres, roods, &c. are there in 5000000 square yards?
26) What number of square miles, acres, roods and rods is equivalent to 90000000 square feet?

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[*] *Reduce them all* to quarters, and divide by 121 — 30¼ square *yards being equal to* 121 quarter square yards.

[†] *Reduce them to* quarters, and divide by 1089.

Wine Measure.

1) How many pints are there in 5 quarts?
2) How many quarts are there in 7 gallons?
3) How many gallons are there in 4 hogsheads?
4) How many hhds. are there in 4 pipes?
5) How many pints are there in 5 gallons?
6) How many quarts are there in 4 hhds.?
7) How many quarts are there in 14 hhds. 34 gallons?
8) Reduce 24 hhds. 17 gals. 3 qts. to pints.
9) Reduce 43 hhds. 47 gals. 2 qts. 1 pt. to pints.
10) Change 4 pipes 1 hhd. 39 gals. 3 qts. into pints.
11) Change 34 pipes into quarts.
12) Change 31 hhds. and 2 qts. into pints.
13) How many pints are equivalent to 45 pipes, 1 hhd. 59 gals.?
14) How many quarts are equivalent to 145 pipes?
15) How many gallons are equivalent to 147 tuns?
16) How many quarts are contained in 8 pints?
17) How many quarts are there in 13 pints?
18) How many gallons are there in 147 quarts?
19) How many hhds. are there in 1489 gallons?
20) How many hhds. are there in 14984 gals.?
21) How many hhds. and gals. are there in 44987 quarts?
22) How many hhds. and gals. are there in 50000 pints?
23) How many hhds. gals. and qts. are there in 49475 pints?
24) Change 147854 pints into quarts, gallons and hhds.?
25) Change 36520 pts. into qts., gals., hhds., pipes and tuns.
26) Change 49835 gallons into hhds. pipes and tuns.
27) How many gallons, hhds. and pipes are equivalent to 43440 quarts?
28) How many gallons, hhds. pipes and tuns are equivalent to 100000 pints?
29) How many quarts, gallons, hhds. pipes and tuns are equal to 4390000 pints?
30) How many hhds., gals., qts. and pints are equivalent to *1000000* pints?

Beer Measure.

1) How many quarts are there in 1 barrel?
2) How many pints are there in 3 barrels?
3) How many quarts are equivalent to 5 bls. 31 gals.?
4) How many gallons are there in 4 hogsheads?
5) How many pints are there in 14 barrels?
6) Reduce 3 bls. 24 gals. 3 qts. to pints.
7) Reduce 2 hhds. 51 gals. 2 qts. to pints.
8) Change 3 hhds. 3 qts. to pints.
9) Convert 4000 pints into barrels.
10) Change 3240 pints into hhds.
11) Change 3746 quarts into barrels.
12) How many hogsheads, gals. qts. and pints are there in 154341 pints?
13) How many bls. gals. qts. and pints are there in 40000 pints?
14) How many barrels are equivalent to 64 hhds.?
15) How many hhds. are equivalent to 17280 bls.?
16) How many hhds. of beer are equal to 12 hhds. of wine?

Cubic or Solid Measure.

1) How many solid inches are equivalent to 3 cubic feet?
2) How many solid feet are equivalent to 5 solid yards?
3) How many cubic inches are there in 17 cubic yards?
4) How many feet of round timber are there in 140 tons or loads?
5) How many feet of hewn timber are there in 140 tons or loads?
6) How many solid feet are there in 4 cords of wood?
7) How many solid inches are there in 250 cubic yards and 21 cubic feet?
8) How many cords of wood are there in 6912 cubic feet?
9) How many cords of wood are equivalent to 16896 solid feet?
10) How many solid ft. are contained in 787960 sol. inches?

11) How many solid yards and feet are there in 175404 solid inches?

12) Change 477241 solid inches to solid feet and yards.

Dry Measure.

1) How many pints are there in 12 quarts?

2) How many quarts are there in 4 pecks?

3) How many pecks are there in 28 bushels?

4) How many bushels are there in 144 chaldrons?

5) Change 3 chaldrons into bushels.

6) Change 40 pecks into bushels.

7) Change 360 bushels into chaldrons.

8) How many bushels, pecks and quarts are equivalent to 1880 pints?

9) How many bushels, pecks, quarts, &c. are there in 1000000 pints?

10) Find the bushels and pecks contained in 50000 quarts?

Time Measure.

1) How many seconds are there in 6 minutes?

2) How many minutes are there in 12 hours?

3) How many minutes are there in 3 days 5 hours?

4) How many days are there in 15 years?

5) How many years are there in 14000000 minutes? *

6) Change 3 years into days.

7) Change 4 years 127 days into hours.

8) Reduce 2 years 4 days 5 hours to minutes.

9) How many seconds are there in a century?

10) Change 3600 seconds to hours.

11) Change 34800 hours into days.

12) How many days and hours are in 300600 minutes?

13) How many years and days are there in 14960 days?

---

* Reduce 1 year to minutes, and divide that number into 14000000.

14) How many years, days and hours are there in 300000 hours?

15) How many years, days, hours and minutes are there in 360000000 minutes?

16) How many days, hours, minutes and seconds are there in 3754000 seconds?

17) How many years, days, hours, minutes and seconds are there in 145000000 seconds?

18) How many days are there in 5 weeks?

19) How many weeks are there in 7 months?

20) How many days and hours are there in 4 Julian years?

21) How many calendar months are there in 14 years?

22) How many weeks are there in 420 days?

23) How many months and weeks are there in 35000 days?

24) How many Julian years are there in 364800 hours?*

25) How many years are there in 48000 calendar months?

B. COMPOUND ADDITION.

RULE. When the numbers of the same denomination are written under one another, begin at the lowest denomination, which being added up, find how many units of the next higher denomination are contained in them. Write down the remainder, and carry the units to the next higher denomination; and proceed in the same way to the end.

a. Federal Money.

	$.	*cts.*	*mls.*
1) Add	45	75	3
	14	9	2
	348	37	5
	144	28	9
	34	9	
		75	4

	$.	*cts.*	*mls.*
2) Add	3475	99	9
	324	76	5
	37	17	3
	9	45	
	1	50	7
	25	49	

---

* Change a Julian year to hours, and divide that number into 364800.

	$.	cts.	mls.
3) Add	15	62	5
	474	47	4
	4987	15	9
	5678	49	3
	10785	57	4
	34989	94	7
	48734	58	4
	37894	17	9
	3467	87	3

	$.	cts.	mls.
4)	61475	77	5
	4134	45	7
	346	47	5
	24	62	5
	9	32	2
		14	3
		9	2
			7

b. *English Money.*

	£.	s.	d.	f.
1) Add	347	17	9	3
	1278	14	8	2
	3489	18	9	2
	47345	19	7	3
	1987	15	6	2

	£.	s.	d.	f.
2)	3473	17	9	2
	498	14	3	2
	1098	15	11	3
	20034	17	10	2
	76576	10	9	1
	345673	9	8	3
	1098764	8	7	2
	4609345	17	4	2

	£.	s.	d.	f.
3)	4745	17	9	3
	2875	13	3	1
	3467	15	2	1
	14567	19	8	2
	34678	17	10	3
	37468	18	11	2
	46734	19	9	3
	75467	17	8	2
	38975	18	10	3
	46734	19	9	2
	413467	17	7	3
	873245	18	8	2

	£.	s.	d.	f.
4)	147	13	9	3
	49	14	10	
	9	17	8	2
	4567	19	3	
	346	15	11	3
		14	9	2
			10	3
			3	3
		11	10	2
	3	19	9	3
	14	5	6	2
	256	19	5	3

	£.	*s.*	*d.*	*f.*
5) Add	345	17	9	3
	41478	14	10	2
	3657	17	9	3
	463	18	10	
	46	10		
	4		11	2
	17			
	245			

	£.	*s.*	*d.*	*f.*
6)	434674	17	9	3
	74873	14	11	2
	4632	17	10	3
	467	18	9	2
	34	19	8	1
	9	15	7	2
		14	6	3
			6	2
				3

c. *Troy Weight.*

	lbs.	*oz.*	*pwt.*	*gr.*
1) Add	5	10	14	22
	2	11	17	20
	3	8	9	23
		11	14	19
	1	9	18	20

	lbs.	*oz.*	*pwt*	*gr.*
2)	32	10	14	00
	5	9	17	
	3	11	18	23
	45	7	15	19
	3	10	17	

	lbs.	*oz.*	*pwt.*	*gr.*
3)	145	11	19	20
	13	10	18	19
	3	8	17	17
		9	19	23
			14	17
			9	13

	lbs.	*oz.*	*pwt.*	*gr*
4)	100	11	17	19
	32	10	18	14
	5	11	13	
	14	9	15	
	19	14		
	22			

	lbs.	*oz.*	*pwt.*	*gr.*
5)	45	00	17	00
	9	3	14	
		11		3
	8	9	14	21
			18	19
		10	3	20
		8		17

	lbs.	*oz.*	*pwt.*	*gr.*
6)	135	10	13	15
	41	10	17	14
	13	9	14	23
	9	8	11	17
	3	4	15	18
	1	9	17	22
	9	10	18	23
		9	17	21

d. Avoirdupois Weight.

	cwt.	*qrs.*	*lbs.*	*oz.*	*dr.*
1) Add	14	1	14	12	9
	17	3	17	15	9
	18	2	20	13	15
	19	3	19	15	14
	13	2	17	9	15
	15	3	24	13	9

	tons.	*cwt.*	*qrs.*	*lbs.*	*oz.*	*dr.*
2)	18	17	3	17	10	14
	36	18	1	20	9	14
	14	19	2	24	8	15
	15	14	1	17	5	10
	29	17	2	24	4	9
	34	19	3	26	9	15

	tons.	*cwt.*	*qrs.*	*lbs.*	*oz.*	*dr.*
3)	14	14	3	17	14	9
		17	2	25		3
		14	2	17	9	14
		15	3	15	12	15
			2	17	15	14
					13	9

	tons.	*cwt.*	*qrs.*	*lbs.*	*oz.*	*dr.*
4)	24	17	3	25	14	15
		18		14	9	
			2	27	13	9
			3	14	9	14
				24	7	
					13	11

	tons.	*cwt.*	*qrs.*	*lbs.*	*oz.*	*dr.*
5)	145	17	3	14	9	5
	48	18	2	15	9	14
	9	14	3	27	11	9
		19	2	25	9	8
			3	17	8	5
				14	14	7
					15	8
						14

	tons.	*cwt.*	*qrs.*	*lbs.*	*oz.*	*dr.*
6)	345	17	3	14	15	15
	487	14	2	25	14	9
	435	15	3	17	15	
	324	19	2	24		
	175	14	3	9		
	328	12	2			
	475	19				
	200					

e. Cloth Measure.

	yd.	*qr.*	*nl.*
1) Add	471	3	2
	241	2	3
	457	3	1
	48	2	3
	19	3	3
	14	3	2

	E. Fl.	*qr.*	*nl.*
2)	873	2	3
	485	2	3
	44	1	1
	98	2	2
	9	2	3
	9	1	3

	E.Fl.	*qr.*	*nl.*
3)	481	2	3
	486	3	2
	537	2	1
	427	3	2
	356	4	3
	415	4	1

	E.E.	*qr.*	*nl.*
4) Add	563	2	2
	412	3	3
	417	3	2
	48	4	1
	14	4	2
	9	4	1

	yd.	*qr.*	*nl.*
5)	343	3	2
	45	2	3
	9	3	3
		3	2
			3
			2

	E.Fl.	*qr.*	*nl.*
6)	341	2	3
	441	2	2
	364	2	
	456	1	
	145		
	94		

	E.Fr.	*qr.*	*nl.*
7)	349	4	3
	145	3	2
	47	2	3
	14	3	1
		4	3
		2	3
			3

	yd.	*qr.*	*nl.*
8)	456	3	2
	1745	2	3
	498	2	1
	79	3	
	2	1	3
	9	2	2
		3	3

	E.E.	*qr.*	*nl.*
9)	345	4	3
	214	4	2
	41	2	3
	24	3	
	45	2	
	17		
	32		

f. Wine Measure.

	tun.	*hhd.*	*gal.*	*qt.*	*pt.*
1) Add	187	1	45	3	1
	415	3	27	2	1
	94	1	34	1	1
	14	2	14	2	1
	9	1	45	3	1
	8	3	52	2	1
	3	2	61	3	1

	tun.	*hhd.*	*gal.*	*qt.*	*pt.*
2)	34	1	62	3	1
	457	3	57	2	1
	323	2	44	3	1
	148	3	37	2	1
	49	2	14	3	1
	4	2	43	2	1
		3	14	3	1

	hhd.	*gal.*	*qt.*	*pt.*
3)	34	17	3	1
	24	45	2	1
	14	13	3	1
		45	3	1
		47	3	1
			2	1
			3	1
				1

	tun.	*hhd.*	*gal.*	*qt.*	*pt.*
4)	345	3	43	2	1
	341	2	47	3	1
	45	2	47	3	1
	14	3	14	2	1
		3	49	3	1
		2	53	2	1
			47	3	1
				2	1

	tun.	pi.	hhd.	gal.	qt.	pt.
5) Add	324	1	1	47	3	1
	24	1	1	37		1
		1	1	47	2	1
			1	37	3	1
	36	1	1	48	3	1
	347	1	1	38	2	1
	48	1	1	27	3	1

	tun.	hhd.	gal.	qt.	pt.
6)	346	3	48	3	1
	48	2	47	2	1
	9	3	57	3	1
		2	49	2	1
			14	3	1
			6	2	1
				2	1

g. *Beer Measure.*

	hhd.	gal.	qt.	pt.
1) Add	48	31	3	1
	49	51	1	1
	52	52	2	1
	53	14	3	1
	14	15	1	1
	19	3	1	1

	hhd.	gal.	qt.	pt.
2)	78	45	3	1
	144	47	2	1
	134	35	1	1
	54	32	3	1
	9	19	1	1
	6	5	1	1

	hhd.	gal.	qt.	pt.
3)	345	47	3	1
	45	13	1	1
	3	20	2	1
	20	19	1	1
	145	5	3	1
	6	6	1	1

	butt.	bl.	gal.	qt.	pt.
4)	15	2	34	3	1
	4	2	27	2	1
	3	1	34	3	1
	45	2	25	3	1
		2	31	3	1
			25	2	1
				2	1
					1

	butt.	bl.	gal.	qt.	pt.
5)	14	2	25	3	1
	24	2	31	2	
	17	2	29		
	14	1	31		
	45	2	9		
	32	3			
	47				

	hhd.	gal.	qt.	pt.
6)	4567	47	3	1
	3214	35	2	1
	415	17	3	
	41	24	2	
	6	27		
	3	15		
	17	47	3	
	348	52	2	1

h. Dry Measure.

	qr.	*bu.*	*pk.*	*qt.*
1) Add	57	4	2	1
	48	5	3	2
	19	6	1	3
	42	7	3	5
	36	4	1	7
	145	5	1	2

	qr.	*bu.*	*pk.*	*qt.*
2)	37	4	2	3
	24	3	3	2
	34	5	1	4
	124	6	3	5
	76	4	2	6
	38	7	3	5

	ch.	*bu.*	*pk.*	*qt.*
3)	547	31	1	3
	324	28	2	7
	567	25	3	4
	34	19	3	5
	2	7	2	4

	ch.	*bu.*	*pk.*	*qt.*
4)	3414	15	1	3
	415	34	2	7
	36	19	3	4
	7	25	2	5
		7	2	2
			3	3
				7

	ch.	*bu.*	*pk.*	*qt.*
5)	4673	35	3	5
	4760	27	2	7
	1675	25	3	
	1467	17	2	
	1697	25		
	4673	31		
	4673			

	ch.	*bu.*	*pk.*	*qt.*
6)	341	00	3	0
	24	17	2	5
			1	4
			2	3
		24	2	
	9		3	
	14	25	1	7

k. Long Measure.

1)	*deg.*	*mil.*	*fur.*	*po.*	*ft.*	*in.*	*bar.*
Add	217	17	7	19	11	9	1
	34	24	4	20	12	3	2
	9	25	3	21	13	10	1
	25	37	2	22	9	1	2
	36	24	1	23	14	8	2
	17	16	3	15	15	11	1
	314	39	2	19	16	9	1

2)	*deg.*	*mil.*	*fur.*	*po.*	*ft.*	*in.*	*bar.*
	314	24	7	19	13	11	2
	215	54	3	20	14	10	2
	19	37	4	30	9	9	1
	314	24	6	27	5	3	1
	9	25	5	28	6	8	1
	6	47	2	29	3	10	2
	47	59	1	31	16	11	1

3)	*deg.*	*mil.*	*fur.*	*po.*	*ft.*	*in.*	*bar.*
Add	314	51	9	29	15	9	2
	364	54	3	34	16	11	
	415	47	7	20	7		
	674	36	4	31			
	324	44	5				
	174	47					
	374						

4)	*deg.*	*mil.*	*fur.*	*po.*	*ft.*	*in.*	*bar.*
	1417	17	7	29	14	11	2
	369	24	6	31	15	9	1
	48	17	5	25	9	10	2
	9	43	6	29	12	11	1
		58	7	34	9	8	2
			6	25	10	3	1
				14	9	2	2
				4	3	10	2
					11	9	2
						3	1
							2

	mil.	*fur.*	*po.*	*yd.*	*ft.*
5)	345	7	13	4	2
	467		14		1
		4	17	3	
			29	2	2
	45	7		3	
	1000	3	27		

	mil.	*fur.*	*po.*	*yd.*	*ft.*
6)	147	0	17	0	0
	34	7		4	
		3	29	2	2
		4		3	1
	17		34	2	2
		5	24	3	
			12		2

l. *Land Measure.*

	acr.	*roo.*	*per.*
1) Add	457	3	19
	1474	3	29
	346	1	14
	74	2	17
	500	3	28
	3475	1	27
	467	3	25

	acr.	*roo.*	*per.*
2)	3474	2	34
	672	3	27
	48	1	37
	3		27
	17	3	27
	478		39
	1000	2	

	acr.	*roo.*	*per.*
3)	1475	3	19
	247	2	14
	24	3	27
	9	2	30
		3	37
			29

	acr.	*roo.*	*per.*
4)	147	3	00
	29	3	
	23	2	27
	9	1	38
	24		27

	acr.	*roo.*	*per.*
5)	1417	3	24
	2000	2	17
	347	3	
	47	2	
	9		

	acr.	*roo.*	*per.*
6)	00	3	00
	4		17
			34
		2	37
		1	29

m. *Time Measure.*

	yr.	*da.*	*h.*	*min.*	*sec.*
1) Add	189	149	23	13	12
	48	540	19	12	13
	37	376	17	15	15
	7	270	4	17	45
	24	98	5	40	49
	387	57	18	58	52

	yr.	*da*	*h.*	*min.*	*sec.*
2)	300	169	14	17	37
	20	45	17	29	28
	9	14	23	59	19
	36	187	22	59	59
	9	48	19	24	30
	28	59	30	17	45

	yr.	*da.*	*h.*	*min.*	*sec.*
3)	345	30	24	30	30
	49	50	9	30	25
	9	9	17	35	17
	40	29	18	45	18
	346	345	19	19	50
	1072	76	11	45	40

	yr.	*da.*	*h.*	*min.*	*sec.*
4)	347	147	23	17	47
	48	300	22	49	48
	9	257	19	14	35
		341	23	50	32
		46	17	49	17
			22	17	48
				9	33

	mo.	*wk.*	*da.*
5) Add, also,	9	3	2
	3	2	5
	4	1	6
	1	2	5
	3	1	4

	mo.	*wk.*	*da.*
6)	10	3	5
	4		4
		2	2
			5
	9	2	4

C. COMPOUND SUBTRACTION.

Rule. Place the smaller number under the greater; then subtract each number in the lower line from that which stands above it, and write down the remainder.

If some of the lower denominations happen to be greater than the upper, increase the upper by as many as make a unit of the next higher denomination; then take the figure in the lower line from it, and set down the remainder: but whenever this is done, carry one to the next number in the lower line, and subtract as before.

a. Federal Money.

		$.	cts.	mls.
1)	From	450	74	5
	Take	74	37	4

		$.	cts.
2)	From	300	00
	Take	47	75

		$.	cts.
3)	From	100	0
	Take		1

		$.	cts.	mls.
4)	From	1	0	0
	Take			5

		$.	cts.	mls.
5)	From	1000	00	0
	Take	10	54	7

		$.	cts.	mls.
6)	From	1450	00	5
	Take	175	50	

		$.	cts.	mls.
7)	From	145	70	4
	Take	97	89	5

		$.	cts.	mls.
8)	From	400	50	0
	Take	49	75	6

b. English Money.

		£.	s.
1)	From	47	9
	Take	34	5

		£.	s.	d.
2)	From	45	10	6
	Take	19	8	4

		£.	s.	d.
3)	From	100	00	0
	Take	10	10	6

		£.	s.	d.
4)	From	140	17	9
	Take	49	18	6

		£.	s.	d.
5)	From	1000	0	0
	Take			6

		£.	s.	d.
6)	From	304	12	6
	Take	57	18	4

		£.	s.	d.	f.
7)	From	145	13	7	2
	Take	45	14	6	3

		£.	s.	d.	f.
8)	From	4575	16	9	0
	Take	493	17	4	3

c. *Troy Weight.*

	lb.	*oz.*	*pwt.*	*gr.*
1) From	47	7	11	14
Take	34	6	3	9

	lb.	*oz.*	*pwt.*	*gr.*
2) From	47	0	17	13
Take	3	5	18	2

	lb.	*oz.*	*pwt.*	*gr.*
3) From	48	5	0	17
Take	19	4		23

	lb.	*oz.*	*pwt.*	*gr.*
4) From	87	9	17	20
Take	68	10	18	19

	lb.	*oz.*	*pwt.*	*gr.*
5) From	147	6	0	14
Take	98	4	3	17

	lb.	*oz.*	*pwt.*	*gr.*
6) From	40	0	0	0
Take		5	14	22

d. *Avoirdupois Weight.*

	ton.	*cwt.*	*qr.*	*lb.*	*oz.*	*dr.*
1) From	45	17	3	27	15	9
Take	7	19	2	14	13	7

	ton.	*cwt.*	*qr.*	*lb.*	*oz.*	*dr.*
2) From	400	5	2	24	13	9
Take	47	12	1	27	8	15

	ton.	*cwt.*	*qr.*	*lb.*	*oz.*
3) From	140	7	0	0	0
Take	17	18	3	15	9

	ton.	*cwt.*	*qr.*	*lb.*	*oz.*	*dr.*
4) From	340	7	0	14	0	9
Take	75	5	3	27	5	4

	ton.	*cwt.*	*qr.*	*lb.*	*oz.*
5) From	500	0	0	0	0
Take		17	3	14	9

	ton.	*cwt.*	*qr.*	*lb.*	*oz.*	*dr.*
6) From	1	0	0	0	0	0
Take					3	15

e. *Apothecaries' Weight.*

	lb.	*oz.*	*dr.*	*sc.*	*gr.*
1) From	3	4	4	1	13
Subtract	1	2	3	1	12

	lb.	*oz.*	*dr.*	*sc.*	*gr.*
2) From	4	7	0	2	15
Take	1	4	1	2	17

		lb.	oz.	dr.	sc.	gr.
3)	From	3	1	5	0	14
	Take		5	7	2	17

		lb.	oz.	dr.	sc.	gr.
4)	From	4	0	4	0	0
	Take		7	5	2	14

		lb.	oz.	dr.	sc.	gr.
5)	From	2	1	3	0	14
	Take		5	2	2	15

		lb.	oz.	dr.	sc.	gr.
6)	From	3	0	5	0	0
	Take				1	17

f. Cloth Measure.

		yd.	qr.	nl.
1)	From	14	1	2
	Take	3	2	3

		E.Fl.	qr.	nl.
2)	From	13	2	0
	Take	2	3	1

		E.E.	qr.	nl.
3)	From	419	1	2
	Take	45	3	3

		E.Fr.	qr.	nl.
4)	From	140	3	0
	Take	69	5	2

		yd.	qr.	nl.
5)	From	44	3	1
	Take	34	2	3

		yd.	qr.	nl.
6)	From	150	2	0
	Take	58	3	2

g. Wine Measure.

		tun.	hd.	gal.	qt.	pt.
1)	From	594	2	14	3	1
	Take	56	1	12	2	1

		tun.	hd.	gal.	qt.	pt.
2)	From	400	2	40	0	0
	Take	59	1	57	3	1

		tun.	hd.	gal.	qt.	pt.
3)	From	563	3	0	0	0
	Take	45	2	57	3	1

		tun.	hd.	gal.	qt.	pt.
4)	From	100	0	0	0	0
	Take	47	3	47	2	1

		tun.	hd.	gal.	qt.	pt.
5)	From	54	1	43	0	1
	Take	39	3		2	1

		tun.	hd.	gal.	qt.	pt.
6)	From	175	0	32	0	0
	Take		2	49	3	1

h. Ale and Beer Measure.

1)	*hd.*	*gal.*	*qt.*	*pt.*
From	400	52	3	1
Take	399	48	2	1

2)	*hd.*	*gal.*	*qt.*	*pt.*
From	40	0	3	0
Take	9	47	2	1

3)	*hd.*	*gal.*	*qt.*	*pt.*
From	13	0	0	0
Take	2	49	3	1

4)	*hd.*	*gal.*	*qt.*	*pt.*
From	185	13	2	1
Take	79	47	3	1

5)	*bl.*	*gal.*	*qt.*	*pt.*
From	45	32	0	0
Take	9	34	3	1

6)	*bl.*	*gal.*	*qt.*	*pt.*
From	100	0	0	0
Take		17	3	1

j. Dry Measure.

1)	*qr.*	*bu.*	*gl.*	*qt.*
From	38	4	6	3
Take	27	3	4	1

2)	*qr.*	*bu.*	*gl.*	*qt.*
From	47	3	0	0
Take	17	5	7	2

3)	*qr.*	*bu.*	*gl.*	*qt.*
From	100	0	0	0
Take	99	7	7	3

4)	*qr.*	*bu*	*gl.*	*qt.*
From	50	0	3	0
Take	47	5		2

5)	*ch.*	*bu.*	*gl.*	*qt.*
From	148	21	3	1
Take	59	35	4	2

6)	*ch.*	*bu.*	*gl.*	*qt.*
From	100	0	0	0
Take		7	4	1

k. Long Measure.

1)	*deg.*	*m.*	*fu.*	*po.*	*ft.*	*in.*	*bar.*
From	962	14	7	6	14	11	2
Take	497	45	3	1	12	9	1

2)	*deg.*	*m.*	*fu.*	*po.*	*ft.*	*in.*	*ba.*
From	375	45	7	6	14	0	0
Take	49	50	3	27	5	11	2

3)	*deg.*	*m.*	*fu.*	*po.*	*ft.*	*in.*	*bar.*
From	1	0	0	0	0	0	0
Take		40	7	5	1	9	2

4)	*deg.*	*m.*	*fu.*	*po.*	*ft.*	*in.*	*bar.*
From	36	30	3	17	10	9	1
Take	5	19	7	24	9	10	2

5)	*mil.*	*fu.*	*po.*	*ft.*
From	500	7	13	9
Take	49	5	24	7

6)	*mil.*	*fu.*	*po.*	*yd.*
From	400	7	24	0
Take	59	2	35	2

l. Land Measure.

1)	*acr.*	*roo.*	*per.*
From	400	1	12
Take	245		15

2)	*acr.*	*roo.*	*per.*
From	501	3	14
Take	185	1	23

3)	*acr.*	*roo.*	*per.*
From	1000	0	0
Take		1	37

m. Time Measure.

		yr.	*da.*	*h.*	*mn.*	*sec.*
1)	From	475	170	17	45	15
	Take	76	69	23	30	8

		yr.	*da.*	*h.*	*min.*	*sec.*
2)	From	100	0	0	0	0
	Take		14	7	45	15

		yr.	*da.*	*h.*	*mn.*	*sec.*
3)	From	1	0	0	0	0
	Take					1

		yr.	*da.*	*h.*	*mn.*	*sec.*
4)	From	50	150	0	45	15
	Take	17	300	14		

		mo.	*wk.*	*da.*
5)	From	5	3	6
	Take	1	2	5

		mo.	*wk.*	*da.*
6)	From	12	4	0
	Take	3	3	4

		mo.	*wk.*	*da.*
7)	From	13	0	0
	Take		3	5

		mo.	*wk.*	*da.*
8)	From	1	0	0
	Take			1

D. COMPOUND MULTIPLICATION

Rule. Place the multiplier under the lowest denomination of the multiplicand: multiply the lowest denomination of the multiplicand by the multiplier, and find how many of the next higher denomination are contained in them: write down the remainder, and carry the quotient to the product of the next multiplication; and so on. The last product on the left, if it is, at the same time, the highest denomination we wish to find, is set down without any further division.

a. Federal Money.

	$.	*cts.*	*ml.*		$.	*cts.*	*ml.*
1) Multiply	405	75	5	2) Multiply	475	93	2
by			5	by			25
	$.	*cts.*	*ml.*		$.	*cts.*	*ml.*
3) Multiply	1745	40	7	4) Multiply	469	00	5
by			347	by			747
	$.	*cts.*	*ml.*		$.	*cts.*	*ml.*
5) Multiply	798	00	1	6) Multiply	980	05	7
by			24	by			48

b. English Money.

	£.	*s.*	*d.*	*f.*		£.	*s.*	*d.*	*f.*
1) Multiply	493	17	9	3	2) Multiply	19	15	0	3
by				4	by				6
	£.	*s.*	*d.*	*f.*		£.	*s.*	*d.*	*f.*
3) Multiply	493	0	9	2	4) Multiply	4195	17	3	1
by				8	by				24

	£.	s.	d.	f.
5) Multiply	1975	19	11	2
by				36

	£.	s.	d.	f.
7) Multiply	5195	14	9	1
by				124

	£.	s.	d.	f.
9) Multiply	9875	16	0	2
by				1450

	£.	s.	d.	f.
6) Multiply	900	15	6	2
by				54

	£.	s.	d	f.
8) Multiply	947	16	8	3
by				345

	£.	s.	d.	f.
10) Multiply	1475	0	9	2
by				1000

c. *Troy Weight.*

	lb.	oz.	pwt.	gr.
1) Multiply	145	7	14	21
by				9

	lb.	oz.	pwt.	gr.
3) Multiply	340	7	0	1
by				27

	lb.	oz.	pwt.	gr.
2) Multiply	147	7	0	11
by				10

	lb.	oz.	pwt.	gr.
4) Multiply	449	0	11	17
by				125

d. *Avoirdupois Weight.*

1)	ton.	ct.	qr.	lb.	oz.	dr.
Multiply	14	17	3	25	11	14
by						5

3)	ton.	ct.	qr.	lb.	oz.	dr.
Multiply	97	10	3	17	10	10
by						45

5)	ton.	ct.	qr.	lb.	oz.	dr.
Multiply	179	0	3	17	0	15
by						325

2)	ton.	ct.	qr.	lb.	oz.	dr.
Multiply	19	13	3	0	11	15
by						12

4)	ton.	ct.	qr.	lb.	oz.	dr.
Multiply	86	11	2	17	15	9
by						100

6)	ton.	ct.	qr.	lb.	oz.	dr.
Multiply	495	15	0	24	9	3
by						500

e. Apothecaries' Weight.

	lb.	*oz.*	*dr.*	*sc.*	*gr.*		*lb.*	*oz.*	*dr.*	*sc.*	*gr.*
1) Multiply	5	7	5	1	13	2) Multiply	5	5	6	1	15
by					12	by					20

f. Cloth Measure.

	yd.	*qr.*	*nl.*		*E.Fl.*	*qr.*	*nl.*
1) Multiply	45	3	1	2) Multiply	347	2	2
by			3	by			7

	E.Fr.	*qr.*	*nl.*		*E.E.*	*qr.*	*nl.*
3) Multiply	149	4	2	4) Multiply	95	3	1
by			15	by			28

	yd.	*qr.*	*nl.*		*yd.*	*qr.*	*nl.*
5) Multiply	375	3	2	6) Multiply	345	2	1
by			35	by			100

g. Wine Measure.

	tun.	*hd.*	*gl.*	*qt.*	*pt.*		*tun.*	*hd.*	*gl.*	*qt.*	*pt.*
1) Multiply	34	2	47	3	1	2) Multiply	300	3	52	1	1
by					9	by					16

	tun.	*hd.*	*gl.*	*qt.*	*pt.*		*tun.*	*hd.*	*qt.*	*pt.*
3) Multiply	140	3	47	0	1	4) Multiply	345	3	3	1
by					42	by				56

	tun.	*hd.*	*gl.*	*qt.*	*pt.*		*tun.*	*hd.*	*gl.*	*qt.*	*pt.*
5) Multiply	1450	3	45	3	1	6) Multiply	376	3	57	3	1
by					127	by					325

h. Ale and Beer Measure.

1)	*hd.*	*gal.*	*qt.*	*pt.*
Multiply	49	45	3	1
by				8

2)	*hd.*	*gal.*	*qt.*	*pt.*
Multiply	69	47	3	1
by				16

3)	*hd.*	*gal.*	*qt.*	*pt.*
Multiply	361	45	3	1
by				126

4)	*hd.*	*gal.*	*qt.*	*pt.*
Multiply	345	51	3	1
by				347

i. Dry Measure.

1)	*qr.*	*bu.*	*pk.*	*qt.*
Multiply	57	3	2	7
by				12

2)	*qr.*	*bu.*	*pk.*	*qt.*
Multiply	314	7	2	3
by				32

3)	*ch.*	*bu.*	*pk.*	*qt.*
Multiply	314	7	3	5
by				17

4)	*ch.*	*bu.*	*pk.*	*qt.*
Multiply	149	5	2	5
by				150

k. Long Measure.

1)	*deg.*	*mi.*	*fu.*	*po.*	*ft.*	*in.*	*ba.*
Multiply	45	47	7	25	7	9	2
by							5

2)	*deg.*	*mi.*	*fu.*	*po.*	*ft.*	*in.*	*ba.*
Mult.	37	14	6	13	9	1	2
by							27

3)	*deg.*	*mi.*	*fu.*	*ft.*	*in.*	*ba.*
Multiply	35	47	7	3	11	1
by						214

4)	*deg.*	*mi.*	*fu.*	*po.*	*ft.*	*in.*	*ba.*
Mult.	32	54	1	29	15	11	2
by							125

l. Time Measure.

1)	*yr.*	*da.*	*h.*	*min.*	*sec.*
Multiply	340	147	22	57	30
by					9

2)	*yr.*	*da.*	*h.*	*min.*	*sec.*
Mult.	37	241	13	45	19
by					24

3)	*yr.*	*da.*	*h.*	*m.*	*sec.*
Multiply	145	19	14	11	6
by					120

4)	*mo.*	*wk.*	*da.*
Multiply	9	3	5
by			245

E. COMPOUND DIVISION.

RULE. Begin with the highest denomination on the left hand, and find how many times the divisor is contained in it. Set down the quotient, and if there be a remainder, reduce it to units of the next lower denomination, and add to it the number (if there be any) which was in this denomination before. This sum divide again by the divisor, put down the quotient, and if there be any remainder, reduce it to units of the next lower denomination; and so on.

a. Federal Money.

	$.	*cts.*	*mil.*		
1) Divide	494	00	0	by	5.
2) Divide	1374	74	5	by	12.
3) Divide	4876	50	0	by	45.
4) Divide	7494	62	5	by	125.
5) Divide	16737	42	7	by	245.
6) Divide	36745	57	4	by	328.

b. English Money.

	£.	*s.*	*d.*	*f.*		
1) Divide	474	17	9	2	by	4.
2) Divide	367	14	6		by	6.
3) Divide	469	16	3	2	by	12.
4) Divide	1493	19	9	3	by	140.
5) Divide	36745	18	8	2	by	268.

c. Troy Weight.

	lb.	*oz.*	*pt.*	*gr.*	
1) Divide	54	9	19	12	by 9.
2) Divide	75		14	20	by 12.
3) Divide	475	10	14		by 28.
4) Divide	674			17	by 36.

d. Avoirdupois Weight.

	ton.	*ct.*	*qr.*	*lb.*	*oz.*	*dr.*	
1) Divide	46	17	3	17	9	15	by 7.
2) Divide	134	14	0	26	5	0	by 12.
3) Divide	346	13	0	18	0	0	by 25.
4) Divide	347	14	3	0	14	0	by 29.
5) Divide	456	6	2	15	0	14	by 37.
6) Divide	128	0	3	0	9	15	by 45.

e. Apothecaries' Weight.

	lb.	*oz.*	*dr.*	*sc.*	*gr.*	
1) Divide	3	9	7	2	14	by 8.
2) Divide	4	6	5	1	17	by 15.
3) Divide	645	7	5	2	19	by 25.
4) Divide	347	6	2	1	18	by 49.

f. Cloth Measure.

	yd.	*qr.*	*nl.*	
1) Divide	45	3	2	by 9.
2) Divide	135	2	3	by 15.
	E.Fr.	*qr.*	*nl.*	
3) Divide	645	4	3	by 9.
	E.E.	*qr.*	*nl.*	
4) Divide	734	4	0	by 12.

g. Wine Measure.

	tun.	*hd.*	*gl.*	*qt.*	*pt.*	
1) Divide	349	1	47	3	1	by 8.
2) Divide	474	1	0	2	1	by 18.
3) Divide	346	1	40	0	1	by 39.

	pi.	*hd.*	*gl.*	*qt.*	*pt.*		
4) Divide	140	1	40	3	1	by	63.
5) Divide	461	1	57	0	0	by	104.

	hd.	*gl.*	*qt.*	*pt.*		
6) Divide	460	45	3	1	by	500.

h. *Ale and Beer Measure.*

	hd.	*gl.*	*qt.*	*pt.*		
1) Divide	149	34	3	1	by	9.
2) Divide	346	40	0	0	by	24.
3) Divide	300	17	0	1	by	36.

	bl.	*gl.*	*qt.*	*pt.*		
4) Divide	45	24	1	1	by	12.
5) Divide	36	0	0	0	by	50.
6) Divide	45	0	3	1	by	64.

i. *Dry Measure.*

	qr.	*bu.*	*pk.*	*qt.*		
1) Divide	57	7	2	1	by	8.
2) Divide	641	6	3	1	by	12.
3) Divide	546	0	0	0	by	100.

	ch.	*bu.*	*pk.*	*qt.*		
4) Divide	576	31	1	3	by	36.
5) Divide	1000	0	0	0	by	45.
6) Divide	945	35	3	7	by	81.

k. *Long Measure.*

	deg.	*mi.*	*fu.*	*po.*	*ft.*	*in.*	*bar.*		
1) Divide	217	45	7	24	15	9	1	by	9.
2) Divide	300	50	0	25	0	8	1	by	15.
3) Divide	800	0	0	0	0	0	0	by	38.

	mi.	*fu.*	*po.*	*ft.*	*in.*	*bar.*		
4) Divide	1400	7	0	16	6	0	by	100.
5) Divide	1200	6	0	0	0	1	by	125.
6) Divide	964	0	0	0	0	0	by	1000.

l. Land Measure.

	acr.	*roo.*	*pr.*	
1) Divide	4748	3	19	by 7.
2) Divide	8100	0	0	by 9.
3) Divide	100000	0	0	by 154.
4) Divide	8000	3	27	by 164.

m. Time Measure.

	yr.	*da.*	*h.*	*min.*	*sec.*	
1) Divide	169	304	21	45	15	by 6.
2) Divide	248	154	6	51	40	by 9.
3) Divide	424	17	3	15	40	by 45.
4) Divide	100	0	0	0	0	by 29.

	mo.	*wk.*	*da.*	
5) Divide	145	3	6	by 7.
6) Divide	300	1	5	by 10.
7) Divide	40	0	0	by 24.
8) Divide	37	2	0	by 20.

F. PROMISCUOUS EXERCISES IN THE COMPOUND RULES.

1. Bought a coat for $24, a cloak for $100, and a hat for $10. What did the whole come to?

2. Bought a house for $3500, a horse and chaise for $300, and furniture for $745 75 cents. What sum did I pay for the whole?

3. Bought the following articles of furniture — a bureau for $19 50 cents, a looking-glass for $35 75 cents, 12 chairs at $3 40 cents apiece, 2 bedsteads at $17 45 cents apiece, 3 doz. wine-glasses at $3 75 cents per dozen, and 2 decanters at $5 50 cents each. What is the whole amount?

4. Sold 5 pair of pantaloons, at $3 62 cents 5 mills a pair; 4 vests, at $2 50 apiece; 6 dozen stocks, at $2 62 cents 5 mills per dozen; 4 doz. handkerchiefs at $9 a dozen, and 1 coat at $17 44 cents. What was the whole amount?

5. Sold 40 yards of American broadcloths, at $3 42 cts. per yard; 62 yards of English cloth, at $12 44 cents per yard; 500 yards of plain white cotton, at 11 cents 5 mills per yard; 1700 yards of printed calico, at 17 cents 5 mills per yard. Required the amount of the whole bill.

6. Sold 12 dozen of claret, at $3 75 cents per dozen; 4 gallons of Malaga, at $1 50 cents per gallon; 40 lbs. of almonds, at 22 cents 5 mills per lb.; 20 gallons of molasses, at 52 cents per gallon; 5 barrels of flour, at $5 35 cents per bl.; 22 lbs. of refined sugar, at 19 cents 5 mills per lb.; and 3 jars of olives, at 62 cents 5 mills apiece. Required the amount of the bill.

7. Bought 20 yards of superfine cloth, at £1 17*s.* 6*d.* sterling per yard; 4 dozen India handkerchiefs, at £3 5*s.* 6*d.* per dozen, and 5 dozen white silk cravats, at £6 10*s.* per doz. What is the amount of the whole?

8. Bought 40 yards of cotton, at 6*d.* per yard; 17 dozen penknives, at £1 4*s.* 6*d.* per dozen; 20 dozen of polished brass buttons, at 15*s.* per dozen; and 24 dozen of gloves, at £1 4*s.* per dozen. What did the whole come to?

9. Bought 500 yards of printed calico, at 9*d.* per yard; 300 yards of fine white muslin, at 1*s.* 3*d.* per yard; 400 yards of printed ditto, at 2*s.* 6*d.* per yard — paid £4 19*s.* 6*d.* freight to America. What is the whole amount of the cost?

10. Bought 400 yards of Irish linen, at 4*s.* 3*d.* per yard; 100 yards superfine ditto, at 5*s.* 6*d.*; 60 yards of linen cambric, at 6*s.* 2*d.* 2*f.* per yard; and 120 yards ditto, inferior quality, at 3*s.* 9*d.* per yard — paid insurance £1 12*s.* and freight £2 15*s.* 9*d.* What is the amount of the whole?

11. Bought an ingot of silver, weighing 26 lbs. 9 oz. 16 pwts. 13 gr.; 3 dozen of silver spoons, weighing 2 lbs. 10 oz. per dozen; and half a dozen silver forks, weighing 1 lb. 6 oz. 6 pwts. How much silver was there in all I bought?

12. Bought 12 silver spoons, each weighing 3 oz. 5 pwts. 4 grains; 6 silver forks, each weighing 2 oz. 16 pwts. 20 grs.; 6 tea-spoons, each weighing 1 oz. 10 pwts. 4 grains; 1 silver tea-pot, weighing 1 lb. 8 oz. 14 pwts.; 1 cream jug, weighing 10 oz. 16 pwts. How much silver did I buy?

13. I have in my ware-house 65 tons 6 cwt. of one article; 4 tons 6 cwt. 3 qrs. 24 lbs. of another; 3 qrs. 26 lbs. 15 oz. of a third; 17 cwt. 13 lbs. 6 oz. 14 dr. of a fourth; and, finally, 14 tons 13 cwt. 1 qr. 13 lbs. of a fifth article. Required the weight of the whole.

14. Shipped from New-Orleans 14 tons 15 cwt. 3 qrs. of coffee; 4 tons 18 cwt. 17 lbs. of sugar, best quality; 45 tons 19 cwt. 2 qrs. 15 lbs. of inferior quality; and 46 tons 3 cwt. 14 lbs. of lead. What was the whole amount shipped?

15. In a drug, five different substances are to be mixed together: of the first, there must be 2 lbs. 4 oz. 3 dr.; of the second, 1 lb. 7 oz. 5 dr. 2 sc.; of the third, 4 dr. 1 sc. 13 gr.; of the fourth, 2 sc. 10 gr.; and of the fifth, 4 lbs. 4 oz. What is the weight of the whole drug?

16. Bought 40 yards 3 qrs. 2 nails of cloth; 35 yds. 2 qrs. 1 nail of cotton, 43 yards 3 nails of cambric, and 52 yards 2 qrs. of silk. How many yards, quarters and nails did I buy in the whole?

17. Bought 251 Ells Fr. 3 qrs. 1 nail of silk; 321 E. Fr. 2 qrs. 1 nail of velvet; 50 E. Fr. 3 qrs. 1 nail of French muslin, and 40 ells 3 qrs. 1 nail of Gros de Naples. How many Ells French did I buy?

18. Sold 40 tuns 1 hhd. 43 gals. of Burgundy; 20 tuns 3 hhds. 54 gals. of claret; 3 tuns 2 hhds. 35 gals. 3 qts. of Madeira; and 54 tuns 44 gals. 3 qts. 1 pt. of Teneriffe. How many tuns, hogsheads, &c. did I sell in the whole?

19. Bought 45 pipes 1 hhd. 54 gals. of sherry; 24 pipes 1 hhd. 3 quarters of Madeira; 4 pipes 1 hhd. 53 gals. 1 qt. of Malaga, and 14 pipes 62 gals. of Bordeaux. What is the quantity of all the wine I bought?

20. Bought 50 hhds. 29 gals. 3 qts. of beer; 53 hhds. 49 gals. 3 qts. 1 pt. of pale ale; 43 hhds. 45 gals. 2 qts. 1 pt. of brown ale. How many hogsheads, gallons, &c. did I buy?

21. Bought 15 bls. 14 gals. 3 qts. of table beer; 13 bls. 24 gals. 3 qts. 1 pt. of Philadelphia porter; 40 bls. 23 gals. 3 qts. 1 pt. of Albany ale, and 32 gals. 3 qts. of pale ale. *How many* barrels, &c. did I buy?

22. Sold 24 qrs. 7 bls. 3 gals. 1 qt. of potatoes; 35 qrs. 4 bush. 5 gals. 3 qts. of wheat; and 13 qrs. 6 bls. 2 gallons 1 qt. of rye. How many bushels did I sell in the whole?

23. Bought 62 chaldrons 21 bushels 1 gallon 2 quarts of Liverpool coal; 63 chds. 31 bush. 3 gals. of anthracite do.; 14 chds. 3 gals. of Lehigh; and 2 chds. 32 bush. 3 gals. of Schuylkill. Required the whole amount of coal I bought.

24. In four different counties I have the following lands, viz: in the first, 581 acres 1 rood 14 perches; in the second, 128 acres 3 roods 24 perches; in the third, 154 acres 3 roods 25 perches; and in the fourth, 768 acres 2 roods 37 perches. How much land do I own in these four counties?

25. A sum of money is to be paid in three instalments: the first instalment is 1 year 320 days from now; the second is 2 years 249 days from the time the first is due; and the third is to be paid 344 days after the second. How long before the whole debt will be paid?

26. From $10 which I had in my pocket, I spent $2 50 cents. How much had I left?

27. From $100 I spent 12 cents 5 mills. How much had I left?

28. I once had $500 with me, from which I spent twentyfive dollars for clothes, $10 50 cents for boots and shoes, $51 56 cents for linen cravats and pocket handkerchiefs; then I bought a hat for $5 50 cents. How much money had I left?

29. I once had $450 50.cents, from which I had to spend $40 for provisions, $125 50 cents for cloth, $23 74 cents for repairing a chaise, and 25 cents toll. How much money had I left?

30. How much money shall I have left, if I take 3 shillings from £1?

31. How much, when I take 1 penny from £1?

32. How much if I take 1 farthing from £100?

33. I once had £40 17*s*. 6*d*. in my pocket, from which I *spent £3 19s. 9d.* What had I remaining?

34. What remains when 17*s.* 9*d.* 3 farthings are taken from £2 10*s.*?

35. I once had a lump of silver weighing 4 lbs. 3 oz. 19 pwts., from which I had 6 silver spoons made, each weighing 3 oz. 2 pwts. 10 grains. How much silver had I remaining?

36. From a certain merchandise, weighing 18 tons, 19 cwt. 3 qrs. I sold 15 tons 17 cwt. 2 qrs. 17 lbs. 6 oz. How much had I left?

37. Of a certain commodity I had on hand 450 tons 14 cwt. 1 qr. 20 lbs. 1 oz., but sold from it 179 tons 17 cwt. 24 lbs. 13 dr. How much have I remaining?

38. Had on hand 500 tons of sugar, of which I sold 147 tons 17 cwt. 3 qrs. 15 lbs. 14 oz. 2 dr. How much had I remaining?

39. Bought 40 tons 10 cwt. of sugar, but sold again 10 tons 15 cwt. 3 qrs. 14 lbs. 7 dr. How much have I left?

40. From 50 yards 3 qrs. 2 nails of broadcloth, I sold 14 yards 2 qrs. 3 nails. How much had I left?

41. From 45 Ells Fr. 1 qr. 1 nail, I sold 17 E. Fr. 3 qrs. 2 nails. What is the remainder?

42. I once had 45 tuns 1 hhd. 17 gals. 2 qts. 1 pt. of claret, but shipped again 17 tuns 3 hhds. 45 gallons. How much have I remaining?

43. Bought 52 pipes 1 hhd. 14 gals. 3 qts. of port, but sold again 49 pipes 47 gals. 3 qts. 1 pt. How much have I remaining?

44. From 49 hhds. 35 gals. 1 qt. of ale, I sold 40 hhds. 51 gals. 3 qts. How much have I remaining?

45. From 10 bls. 10 gals. 1 qt. of beer, I sold 9 bls. 34 gals. 3 qts. 1 pt. What is the remainder?

46. From 15 chaldrons 17 bushels of coal, I sold 14 chs. 35 bus. 3 pks. 1 qt. How much had I remaining?

47. Bought 44 qrs. 6 bush. 1 peck of potatoes, but gave away 39 qrs. 5 bush. 3 pecks 1 quart. How much had I remaining?

48. Of a journey of 540 miles I have already travelled 124 miles 7 furlongs 12 poles 3 yards 2 feet. How much more have I to travel?

49. From 20000 acres of land, I sold first 4000 acres 3 roods 19 perches, then again 1700 acres 3 roods 18 per., and finally 10000 acres 2 roods 35 perches. How much land have I still remaining?

50. On the 20th of May, 1833, I was 28 years old. How old was I on the 5th of April, 1820? How old on the 19th of June, 1809?

51. Seven gentlemen owe me each $745 75 cents. How much money do they owe me?

52. I bought 453 acres of land, at $3 50 cents an acre. How much did the whole land come to?

53. Bought 36 bushels of corn, at 75 cents per bushel. What did they cost?

54. Bought 62 pipes of wine, at $37 42 cents 3 mills per pipe. What did the whole cost me?

55. Bought 43 hhds. of molasses, at $27 37 cents 5 mls. per hhd. What did they stand me in for?

56. Sold 367 yards of broadcloth, at $7 62 cents 5 mills per yard. What did I sell the whole for?

57. Sold 245 yards of cotton, at 17 cents 3 mills per yd. What will the whole come to?

58. I owe in four different places, in each £14 19*s*. 9*d*. How much do I owe in the whole?

59. I bought 6 dozen penknives, at £1 9*s*. 6*d*. 2*f*. per dozen. What did the whole amount to?

60. Bought 53 yards of broadcloths, at £1 15*s*. 6*d*. per yard. What did they cost me?

61. Sold 516 bags of cotton, at £4 17*s*. 10*d*. per bag. What did I sell it for?

62. Sold 146 cases of dry goods, at £75 15*s*. 9*d*. 2*f*. per case. What did the whole amount to?

63. Sold 100 boxes of sugar, at £3 17*s*. 9*d*. per box. at did I sell the whole for?

64. I wish to have a dozen silver forks made, of which each is to weigh 3 oz. 12 pwt. 4 grains. How much silver must I have for the whole dozen?

65. Wishing for two dozen silver spoons, each weighing 4 oz. 12 pwts. 10 grains; required what quantity of silver I will have to use for this purpose?

66. A druggist in town has to send to three country customers the same kind of drug; each is made up of 3 lbs. 7 oz. 4 dr. 1 sc. 14 gr. What is the whole quantity of drug he has got to prepare?

67. I have 5 pieces of cloth, each measuring 42 yards 3 qrs. 2 nails. How many yards are there in the whole?

68. Bought 15 pieces of broadcloth, each measuring 57 yards 3 qrs. 2 nails. How many yards, quarters and nails did I buy in the whole?

69. I have four different cellars, and in each 14 pipes 1 hhd. 48 gals. 3 qts. of wine. How much wine had I in all my cellars?

70. I have at six different places in each 14 bls. 34 gals. 3 qts. 1 pint of beer. How much beer have I in the whole?

71. In each of five heaps of coal, there are 7 chaldrons 13 bush. 2 pecks. How much coal is there in all?

72. I travel each day 29 miles 7 fur. 19 poles 13 feet. How far shall I get at this rate in 1 month (30 days)?

73. I work every day 7 hours 35 minutes. How many hours does this make in a year (365 days)?

74. $780 are to be divided equally among 12 persons. What is the share of each?

75. $7340 50 cents are to be divided among 20 persons. What is the share of each?

76. What is the 72d part of $178094 70 cents?

77. What is the 240th part of $1000000?

78. I paid $46700 for 360 feet of land. What was the land per foot?

79. A person paid for 60 oxen $1254 75 cents. What was the *price per* head?

80. A person bought 60 bushels of potatoes, for $22 50. How much did he give per bushel?

81. Sold 12 gallons of wine for $30. What was the price per gallon?

82. Sold 14 yards of broadcloth for $64 75 cents. What was this per yard?

83. For 5 pieces of English broadcloth I was charged £59 16*s*. 3*d*. What was this a piece?

84. What is the 12th part of £140 1*s*. 4*d*.?

85. £140 16*s*. 9*d*. 2*f*. are to be divided equally among 10 persons. What is the share of each?

86. For 5 crates of crockery ware I paid £473 14*s*. 6*d*. What was the price of one?

87. Divide £100 into 6 equal parts. What is one of these parts?

88. What is the third part of £1000 sterling?

89. If a dozen of silver spoons (all of the same weight) weighs 3 lbs. 2 oz. 11 pwts. 12 grains, what is the weight of each?

90. An apothecary is obliged to take the 5th part of 4 lbs. 7 oz. 15 gr. How much must he take?

91. Six persons buy jointly 173 yards 3 qrs. 1 nail of cloth. How much did each buy?

92. Sold to 15 different persons an equal number of yards of cotton. To all of them I sold 455 yards 3 qrs. 2 nails of cotton. How much did I sell to each?

93. What is the 6th part of 188 tuns 1 hhd. 45 gals. 3 qts. of wine?

94. What is the 12th part of 32 bls. 12 gals. of beer?

95. To 5 poor persons I am to give 143 qrs. 2 bushels 1 peck of potatoes. How much is one to receive?

96. How many miles, furlongs, &c. must I travel per day, in order to be in 10 days at the end of my journey, which is 645 miles 7 furlongs 10 poles?

97. 5434 acres 3 roods 32 perches are to be divided among 9 farmers. What is the share of each?

98. 1000 acres are to be divided among 16 persons. How many acres, &c, will each receive?

99. What is the 10th part of a year?

100. What is the 8th part of a year?

101. What is the 6th part of 7 months 2 weeks?

102. What is the 8th part of 17 weeks 6 days?

103. Which cost more, 25 bushels of potatoes at 75 cents per bushel, or 124 yards of tape at 3 cents per yard? By how much?

104. What is the difference in the price between 5 tons of coal at $7 50 cents per ton, and 12 yards of American broadcloth at $3 50 cents per yard?

105. How many acres of land at $3 an acre, can be bought for 46 yards of cloth at $3 a yard?

106. How many acres of land at $3, may be bought for 120 hhds. of wine at $9?

107. What is the cost of 3 lbs. 8 oz. 7 pwts. of silver, at 25 cents per pwt.?*

108. What is the price of 5 tons 13 cwt. 3 qrs. 25 lbs. of sugar, at 16 cents per lb.?

109. What is the price of 3 quarters 4 bushels 2 pecks of wheat, at 12 cents per peck?

110. What is the cost of 341 acres 3 roods 29 perches, at $1 25 cents per perch?

111. What will 3 pounds 7 oz. come to, at 5 cents per scruple?

112. I once paid $34 75 cents for 5 yards of cloth. How much was it a nail?†

113. Paid $541 08 cents for 2 tons 14 cwt. of a certain article. How much is this per cwt.?

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* Reduce them all to pennyweights, and then multiply by 25. This will give you the answer in cents, from which you can easily get the dollars.

† Reduce 5 yards to nails, and divide into 3475 cents.

114. Bought 3 bls. 34 gals. 3 qts. 1 pt. of beer, for $45 76 cents. How much was it a pint?

115. I receive $12 per week. How much is that in a year (52 weeks)?

116. If I receive $12 a week and spend but $5 50 cents, how much shall I be able to lay up in 1 month (4 weeks)? How much in 1 year (52 weeks)?

117. Bought 75 bushels of potatoes, at 18 cents a *peck*. What did they cost me?

118. Bought 14 yds. 3 qrs. of cloth, at 75 cents a nail. What did they cost me?

119. Sold 741 acres 2 roods 18 perches, for $585 60 cents. How much is this a perch?

120. Sold 5 yds. 3 qrs. 2 nails for $1 88 cents. What was this a nail?

SECTION III.

Exercises in Vulgar Fractions.

A. EXERCISES WHICH LEAD TO THE REDUCTION OF FRACTIONS TO THEIR LOWEST TERMS.

a. *To find the Prime Factors of numbers.*

Rule. Divide the given number successively by 2, 3, 5, 7, 11, 13, &c., and so on by all the prime numbers, until the last quotient is no longer divisible by any of these numbers. The successive divisors, together with the last quotient, are the prime factors of the number.

Example.

$$\begin{array}{r|l} 2)\underline{450} & \text{The factors of 450 are, there-} \\ 3)\underline{225} & \text{fore, 2, 3, 3, 5, 5.} \\ 3)\underline{75} & \\ 5)\underline{25} & \\ 5 & \end{array}$$

In the same manner find,

1. The factors of 24.
2. The factors of 45.
3. The factors of 72.
4. The factors of 120.
5. The factors of 1260.
6. The factors of 4500.

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b. To find the Smallest Common Multiple of several given numbers.

Rule. Strike out those numbers which are contained in another; and if any two or more numbers remain, which, although not divisible by one another, are divisible by some other number; divide them by that number, and so on. The product of the numbers remaining, multiplied by all the divisors, is the least common multiple sought. If none of the numbers proposed should be contained in another, nor have any common divisor, then multiply all the numbers together: the product will be the smallest common multiple.

Example.

Find the common multiple of 2, 3, 4, 5, 6, 10, 12.

Then because 2 is contained in 4, and 3 in 6, 4 in 12, 5 in 10, and 6 in 12, strike out 2, 3, 4, 5, 6, when the two remaining numbers, 10 and 12, will be divisible by 2: we must, therefore, divide them by 2, which gives

$$\begin{array}{r|l} 2) & \underline{10\ .\ 12} \\ & \ \ 5\ .\ \ 6 \end{array}$$

Now the product of the two remaining numbers, 5 and 6, is 30, which, multiplied by the divisor 2, gives 60 for the smallest common multiple of the numbers 2, 3, 4, 5, 6, 10, 12.

Do now the following sums:

1) Find the least common multiple of 2, 4, 8.
2) " " " " 2, 3, 6, 5.
3) " " " " 2, 7, 4, 5, 6, 10.
4) " " " " 2, 3, 4, 5, 6, 10, 15.
5) " " " " 4, 5, 6, 7, 3, 2, 10, 14.
6) " " " " 3, 6, 9, 12, 15, 18.

B. REDUCTION OF VULGAR FRACTIONS TO THEIR LOWEST TERMS.

RULE. Divide the numerator and denominator of the fraction by all the factors that are common to both.

Example. Let it be proposed to reduce the fraction $\frac{135}{405}$ to its lowest term.

Then because 3 will divide the numerator and denominator without remainder, 3 is a common factor. Hence,

$$\frac{3)\,135}{3)\,315} \text{ gives } \frac{45}{105};$$

and 3 being again a common factor,

$$\frac{3)\,45}{3)\,105} \text{ we obtain } \frac{15}{35}:$$

and the numerator and denominator again divided by *5*, gives $\frac{3}{7}$ for the lowest term of the fraction $\frac{135}{405}$.

In the same manner do the following sums:

1. Reduce $\frac{4}{8}$ to its lowest term.
2. Reduce $\frac{12}{36}$ to its lowest term.
3. Reduce $\frac{210}{180}$ to its lowest term.
4. Reduce $\frac{448}{504}$ to its lowest term.
5. Reduce $\frac{315}{405}$ to its lowest term.
6. Reduce $\frac{120}{600}$ to its lowest term.
7. Reduce $\frac{36}{180}$ to its lowest term.
8. Reduce $\frac{630}{8085}$ to its lowest term.
9. Reduce $\frac{105}{385}$ to its lowest term.
10. Reduce $\frac{126}{490}$ to its lowest term.
11. Reduce $\frac{189}{245}$ to its lowest term.
12. Reduce $\frac{125}{625}$ to its lowest term.
13. *Reduce* $\frac{64}{128}$ to its lowest term.

C. ADDITION OF FRACTIONS.

RULE I. Place the fractions to be added all under one another, and find the least common multiple of all the denominators, by the rule laid down on page 87. This will be the common denominator of all the fractions to be added. To find the new numerator of each fraction, divide the common denominator by the denominator of each fraction, and multiply the quotient by the numerator of each fraction. These numerators must afterwards be added, and the common denominator written under their sum.

II. If the fraction thus obtained should be larger than 1, that is, if its numerator is larger than the denominator, then divide the numerator by the denominator, to obtain the whole ones, (integers,) and place the remaining fraction by the side of it.

III. When mixed numbers are to be added, then find the common denominator of the fractions alone, as in Rule I.; and having completed the separate addition of the fractions, if that part of the answer should be larger than 1, divide the numerator by the denominator to obtain the integers. Write down the remaining fractions, and add the integers thus obtained to the whole number, which add in the usual way.

These rules will be best illustrated by an example.

Suppose it were required to add the following mixed numbers: $3\frac{1}{2}$, $4\frac{4}{5}$, $7\frac{3}{4}$, $5\frac{2}{3}$, $6\frac{1}{6}$.

	60
$3\frac{1}{2}$	30
$4\frac{4}{5}$	48
$7\frac{3}{4}$	45
$5\frac{2}{3}$	40
$6\frac{1}{6}$	10
$27\frac{53}{60}$	$\frac{173}{60} = 2\frac{53}{60}$
Whole *answer*	**Answer to the** *fractions.*

Then, after having placed them under one another, find the smallest common multiple of 2, 4, 3, 5, 6, which is easily found to be 60, by the Rule on page 87. This will be your common denominator. Write this common denominator (60) on the right side of your fractions, on top of the new numerators, which you find by saying,

2 into 60 go 30 times: once 30 are 30.
5 " 60 " 12 times: 4 times 12 are 48.
4 " 60 " 15 times: 3 times 15 are 45.
3 " 60 " 20 times: 2 times 20 are 40.
6 " 60 " 10 times: once 10 are 10.

Now add up the 10, 40, 45, 48 and 30, which will make the answer to the fraction alone $\frac{173}{60}$. But this fraction being larger than 1, divide the numerator (173) by 60, which will give you 2 whole ones and $\frac{53}{60}$. Write down the $\frac{53}{60}$ in your answer, and add the 2 to the whole numbers 6, 5, 7, 4, 3. $27\frac{53}{60}$ is the answer to the whole sum.

The pupil may now do the following sums by himself:

1) Add $\frac{1}{2}$
$\frac{2}{3}$

2) Add $\frac{3}{4}$
$\frac{5}{8}$

3) Add $\frac{1}{2}$
$\frac{2}{3}$
$\frac{3}{4}$

4) Add $\frac{5}{6}$
$\frac{2}{3}$
$\frac{1}{4}$
$\frac{1}{2}$

5) Add $\frac{3}{4}$
$\frac{1}{2}$
$\frac{4}{5}$
$\frac{9}{10}$
$\frac{11}{12}$
$\frac{13}{15}$

6) Add $\frac{4}{5}$
$\frac{1}{2}$
$\frac{3}{4}$
$\frac{7}{8}$
$\frac{1}{3}$

7) Add $\frac{3}{4}$
$\frac{7}{8}$
$5\frac{1}{2}$
$7\frac{4}{5}$
4

8) Add $\frac{6}{7}$
$\frac{3}{4}$
$\frac{5}{7}$
$\frac{1}{3}$
$\frac{1}{4}$

9) Add $9\frac{3}{4}$
$7\frac{2}{3}$
$5\frac{7}{8}$
$11\frac{5}{6}$

10) Add $7\frac{1}{2}$
$11\frac{3}{4}$
$25\frac{7}{9}$
$9\frac{3}{5}$

11) Add $4\frac{3}{4}$
$7\frac{1}{3}$
$4\frac{7}{9}$
$1\frac{1}{3}$

12) Add $\frac{1}{2}$
$\frac{1}{4}$
$\frac{1}{8}$
$\frac{1}{16}$
$\frac{1}{32}$

13) Add 1
$\frac{1}{3}$
$\frac{1}{9}$
$\frac{1}{27}$
$\frac{1}{81}$
$\frac{1}{243}$

14) Add $4\frac{1}{2}$
$14\frac{3}{4}$
$29\frac{5}{8}$
$46\frac{1}{3}$
$45\frac{5}{6}$
$19\frac{11}{12}$

15) Add $9\frac{5}{7}$
$14\frac{3}{5}$
$12\frac{11}{12}$
$9\frac{1}{3}$
$45\frac{3}{4}$
$15\frac{1}{6}$

16) Add $63\frac{1}{2}$
$14\frac{1}{4}$
$15\frac{7}{8}$
$19\frac{11}{16}$
$24\frac{11}{12}$
$\frac{7}{8}$

D. SUBTRACTION OF FRACTIONS.

Rule I. Find the common denominator of the proposed fraction, which place as in addition. Find the new numerator of each fraction, which being put down as in addition, subtract the lower from the upper, and place the common denominator under the remainder.

II. If it were required to subtract a mixed number from another, then subtract the fraction from the fraction, by the Rule just given, and the whole number from the whole number.

III. If the new numerator of the lower fraction should happen to be greater than the new numerator of the upper fraction, then borrow a unit from the integers, which being reduced to a fraction of the same denominator as the common denominator indicates, and added to the upper numerator, will render the subtraction possible. When afterwards subtracting the integers, carry 1 to the last figure on the right.

Example. Let it be required to subtract $31\frac{4}{5}$ from $40\frac{2}{3}$.

	15
$40\frac{2}{3}$	10
$31\frac{4}{5}$	12
Ans. $8\frac{13}{15}$	$\frac{13}{15}$

The numbers being placed as in addition, write the common denominator, 15, on top; and find the new numerators, 10 and 12, as in addition, by saying,

3 into 15, 5 times: 5 times 2 are 10.
5 into 15, 3 times: 3 times 4 are 12.

Now as you cannot take $\frac{12}{15}$ from $\frac{10}{15}$, borrow 1, which being reduced to $\frac{15}{15}$ as the common denominator indicates, and added to $\frac{10}{15}$, will give $\frac{25}{15}$. You can therefore say, 12 from 25 leaves $\frac{13}{15}$ for the answer of the fractions. Carrying afterwards 1 to the 31, you say, 2 from 10 leaves 8, which will give for the whole answer $8\frac{13}{15}$.

You may now do the following sums:

1) From $\frac{1}{2}$	2) From $\frac{2}{3}$	3) From $\frac{7}{8}$	4) From $\frac{11}{12}$
Take $\frac{1}{4}$	Take $\frac{1}{4}$	Take $\frac{3}{4}$	Take $\frac{9}{10}$

5) From $\frac{11}{12}$ Take $\frac{9}{10}$

6) From $10\frac{1}{2}$ Take $9\frac{3}{4}$

7) From $12\frac{1}{3}$ Take $9\frac{1}{2}$

8) From $15\frac{4}{5}$ Take $9\frac{1}{3}$

9) From $124\frac{5}{6}$ Take $9\frac{7}{8}$

10) From $46\frac{5}{6}$ Take $45\frac{7}{8}$

11) From $147\frac{1}{5}$ Take $19\frac{7}{8}$

12) From $\frac{1}{2}$ Take $\frac{1}{12}$

E. MULTIPLICATION OF FRACTIONS.

RULE I. Multiply the numerators together for a new numerator, and the denominators for a new denominator. If a fraction is to be multiplied by a whole number, then multiply the numerator of the fraction by the whole number, and write the denominator under it. In the same manner proceed if a whole number is to be multiplied by a fraction.

II. If the numbers proposed are mixed numbers, then reduce them to improper fractions, and then multiply numerator by numerator, and denominator by denominator.

III. If some of the numerators to be multiplied should contain a factor common to one of the denominators, then this factor may be suppressed before the multiplication. The same rules will apply to the multiplication of more than two fractions.

These three rules will best be illustrated by examples:

Example 1. Suppose we were to multiply $\frac{2}{3}$ by $\frac{4}{5}$.

Then the numerator 2 multiplied by the numerator 4, gives 8 for a new numerator; and the denominator 3 multiplied by the denominator 5, gives 15 for the new denominator. Our answer, therefore, will be $\frac{8}{15}$; or, in other terms,

$$\frac{2}{3} \times \frac{4}{5} = \frac{8}{15}.\ *$$

Example 2. Suppose it were proposed to multiply $4\frac{1}{2}$ by $3\frac{2}{3}$.

Then the first fraction, reduced to halves, is equal to $\frac{9}{2}$; and the second, reduced to thirds, is equal to $\frac{11}{3}$. Our sum, therefore, is reduced to multiplying $\frac{7}{2}$ by $\frac{11}{3}$, which, *by Rule I, gives* $\frac{7}{2} \times \frac{11}{3} = \frac{77}{6} = 12\frac{5}{6}$.

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he sign × *standing* for "multiplied;" and = for "equal to."

Example 3. Let us suppose we had to multiply $\frac{4}{5}$ by $\frac{5}{16}$. Then, the factor 5 being common to one of the numerators and denominators of the proposed fraction, we can suppress it; by which means our sum is reduced to multiplying $\frac{4}{1}$ by $\frac{1}{16}$; and the factors 4 and 16 being again common to the numerator and denominator, may also be suppressed, which will give $\frac{1}{1} \times \frac{1}{4} = \frac{1}{4}$, for the answer.

The pupil may now do the following sums:

1) Multiply $\frac{3}{4}$ by 2.
2) Multiply $\frac{1}{2}$ by $\frac{3}{4}$.
3) Multiply $4\frac{1}{2}$ by $\frac{3}{4}$.
4) Multiply 6 by $\frac{3}{4}$.
5) Multiply $\frac{3}{4}$ by $\frac{4}{5}$.
6) Multiply $7\frac{1}{2}$ by 5.
7) Multiply $14\frac{3}{4}$ by $1\frac{1}{4}$.
8) Multiply $25\frac{3}{4}$ by 62.
9) Multiply $47\frac{7}{8}$ by 3.
10) Multiply $4\frac{7}{8}$ by $\frac{3}{4}$.
11) Multiply $42\frac{7}{8}$ by $\frac{3}{5}$.
12) Multiply $67\frac{1}{2}$ by $35\frac{4}{5}$.
13) Multiply $\frac{1}{2}$ by $\frac{2}{3}$ and by $\frac{4}{5}$.
14) Multiply $7\frac{3}{4}$ by $\frac{1}{4}$ and by $\frac{3}{8}$.
15) Multiply $\frac{1}{2}$ by $\frac{1}{2}$, and again by $\frac{1}{2}$.
16) Multiply $\frac{1}{10}$ by $\frac{3}{10}$ and by $\frac{1}{3}$.
17) Multiply $\frac{1}{2}$ by $\frac{1}{3}$ and by $\frac{1}{4}$.
18) Multiply $\frac{3}{4}$ by $\frac{7}{8}$ and by $1\frac{3}{4}$.
19) Multiply $\frac{3}{4}$ by $\frac{4}{5}$ and by $\frac{1}{3}$.
20) Multiply $3\frac{3}{4}$ by $4\frac{4}{5}$, by 12 and by 3.

F. DIVISION OF VULGAR FRACTIONS.

Rule I. Invert your divisor and proceed as in multiplication.

II. If the divisor or the dividend should happen to be a whole number, then write it in form of a fraction, by giving it the denominator 1, which is the same as calling it so many *ones;* and proceed as before.

III. If divisor or dividend, or both, should be mixed numbers, then reduce them to improper fractions of their own denominations, and proceed as laid down in Rule I.

Example 1. If we were to divide $\frac{3}{4}$ by $\frac{2}{5}$, it would be *the same as multiplying* $\frac{3}{4}$ by $\frac{5}{2}$. Ans. $\frac{15}{8}$, or $1\frac{7}{8}$.

2. If it were proposed to divide $\frac{3}{4}$ by 2, write it in the form $\frac{3}{4}:\frac{2}{1}$, and inverting the divisor and proceeding as in multiplication, we have $\frac{3}{4}:\frac{2}{1}$, the same as $\frac{3}{4}\times\frac{1}{2}$. ANS. $\frac{3}{8}$.* Or if we had to divide 3 by $\frac{2}{5}$, it is the same as $\frac{3}{1}:\frac{2}{5}$, which is equal to $\frac{3}{1}\times\frac{5}{2}$. ANS. $\frac{15}{2}$ or $7\frac{1}{2}$.

3. If we had to divide $3\frac{1}{2}$ by $4\frac{1}{3}$, we should, by reducing them to improper fractions, obtain $3\frac{1}{2}=7\frac{1}{2}$, and $4\frac{1}{3}=\frac{13}{3}$. Our sum, therefore, would be reduced to dividing $\frac{7}{2}$ by $\frac{13}{3}$; but $\frac{7}{2}:\frac{13}{3}=\frac{7}{2}\times\frac{3}{13}=\frac{21}{26}$, which is the answer sought.

The pupil may now do the following sums by himself:

1) Divide 5 by $\frac{1}{2}$.
2) Divide 6 by $\frac{1}{3}$.
3) Divide 6 by $\frac{2}{3}$.
4) Divide 15 by $\frac{4}{5}$.
5) Divide 8 by $2\frac{1}{2}$.
6) Divide 9 by $3\frac{1}{2}$.
7) Divide 25 by $9\frac{1}{2}$.
8) Divide 35 by $4\frac{4}{5}$.
9) Divide 3 by $4\frac{1}{5}$.
10) Divide 5 by $9\frac{2}{3}$.
11) Divide 1 by $\frac{2}{3}$.
12) Divide 1 by $\frac{4}{5}$.
13) Divide 1 by $2\frac{1}{2}$.
14) Divide $\frac{1}{2}$ by $\frac{1}{3}$.
15) Divide $\frac{1}{4}$ by $\frac{1}{5}$.
16) Divide $\frac{1}{2}$ by $\frac{7}{8}$.
17) Divide $5\frac{3}{4}$ by $\frac{7}{8}$.
18) Divide $7\frac{4}{5}$ by $3\frac{1}{2}$.
19) Divide $12\frac{3}{4}$ by $4\frac{3}{4}$.
20) Divide $15\frac{2}{3}$ by $3\frac{3}{5}$.
21) Divide $15\frac{5}{6}$ by $3\frac{1}{6}$.
22) Divide $31\frac{4}{5}$ by $7\frac{3}{4}$.
23) Divide $1\frac{2}{3}$ by $5\frac{5}{7}$.
24) Divide $5\frac{3}{4}$ by $12\frac{4}{5}$.
25) Divide 2 by $\frac{2}{3}$.
26) Divide $3\frac{1}{2}$ by 5.
27) Divide $4\frac{4}{5}$ by 2.
28) Divide $7\frac{3}{4}$ by 8.
29) Divide $1\frac{4}{6}$ by 12.
30) Divide $3\frac{3}{7}$ by 14.
31) Divide $14\frac{3}{4}$ by 5.
32) Divide $17\frac{2}{3}$ by 3.
33) Divide $14\frac{2}{5}$ by 5.
34) Divide 5 by $3\frac{1}{2}$.
35) Divide 14 by $1\frac{1}{2}$.
36) Divide $1\frac{1}{2}$ by 2.

G. REDUCTION OF VULGAR FRACTIONS.

RULE. When the reduction is *descending*, then multiply the numerator by as many as we must have of the next lower denomination to make one of the denomination of *the fraction*, and divide by the denominator. If there be a remainder, consider it as the numerator of a new fraction, which multiply again by as many as it takes of the next lower denomination to make one of the denomination of that fraction; and so on. The successive quotients, together with the last remainder, will be the fraction reduced.

---

* *: is the sign of* division, and must be read, "divided by."

This will be best understood by an

Example.

£. £$\frac{3}{7}$
3
20
—
7)60(8*s.*
56
—
4
12
—
7)48(6*d.*
42
—
6
4
—
7)24(3$\frac{3}{7}$*f.*
21
—
$\frac{3}{7}$

Ans. 8*s.* 6*d.* 3$\frac{3}{7}$*f.* which are equal to $\frac{3}{7}$ of a pound.

Suppose we wished to reduce $\frac{3}{7}$ of a pound sterling to shillings, pence and farthings. Then, because 20 shillings make £1, multiply the numerator 3 by 20, and divide by the denominator 7: the answer is 8 shillings. The remainder, 4, may now be considered as the numerator of the fraction $\frac{4}{7}$ of a shilling; which, therefore, may be multiplied by 12, and divided by 7, because it takes 12 pence to make 1 shilling. The remainder, 6, of that division, is again multiplied by 4, because it takes 4 farthings to make a penny; and the quotient of this division, together with the remaining fraction $\frac{3}{7}$, is set down in the answer.

When the reduction is *ascending*, that is, when it is proposed to reduce a fraction, or a whole number, or a whole number with a fraction, to a fraction of a higher denomination, then we have the following

Rules: I. If a fraction is to be reduced to one of a higher denomination, then multiply the denominator of that fraction by as many as it would take of that denomination to make one of that denomination to which you have to reduce it.

Example. Suppose $\frac{3}{5}$ shillings are to be reduced to a fraction of a pound. Then, because it takes 20 shillings to make £1, multiply the denominator 5 by 20, and retain the numerator of the fraction. The answer will be $\frac{3}{100}$ of £1.

Again, let it be proposed to find what part of $1 is $\frac{1}{2}$ cent. Then, because 100 cents make $1, multiply the denominator 2 by 100, and retain the denominator 1. The answer is $\frac{1}{200}$ of a dollar.

II. If a *whole* number is to be reduced to a fraction of a higher denomination, then find how many it takes of the denomination of the number to make one of the denomination to which you have to reduce it; then this will be the denominator of your fraction, and the proposed number will be the numerator.

Example. Let it be proposed to reduce 5*d.* to a fraction of a pound. Then, because 12 pence make 1 shilling and 20 shillings £1, it will take 12 times 20 or 240*d.* to make £1, consequently each penny will be $\frac{1}{240}$th part of £1; 240, therefore, is your denominator and 5 your numerator. Consequently $\frac{5}{120} = \frac{1}{24}$ is the answer.

III. If the proposed number is a whole number *and* a fraction, then reduce this number first to an improper fraction of the lowest denomination, and proceed with this afterwards as indicated by Rule I.

To give an Example. Let it be proposed to change $5\frac{3}{4}$*d.* to a fraction of £1. Then $5\frac{3}{4}$ pence reduced to an improper fraction, gives $\frac{23}{4}$ pence; and as it takes 240 pence to make £1, multiply (by Rule I.) the denominator 4 of this fraction by 240, and retain the numerator 23. The answer will be $\frac{23}{960}$. Consequently $5\frac{3}{4}$ pence are $\frac{23}{960}$th of £1.

Another Example.
4*s.* $3\frac{1}{4}$*d.*
12
—
48
$3\frac{1}{4}$
—
$51\frac{1}{4} = \frac{205}{4}$ pence.
and $\frac{205}{4}$*d.* $= \frac{205}{960}$ of £1.
but $\frac{205}{3840}$ *may be* reduced
which is the answ.

Suppose we had to change 4*s.* $3\frac{1}{4}$*d.* to a fraction of £1.—Then reduce 4*s.* 6*d.* to pence, by multiplying 4 by 12, and add in the $3\frac{1}{4}$ pence. The $51\frac{1}{4}$ pence thus obtained, reduce to fourths, which gives you $\frac{205}{4}$ pence.—And the denominator 4, multiplied by 240, gives $\frac{205}{960}$; or, reduced to its lowest term, $\frac{41}{192}$ for the answer.

Example in Federal Money.

Let 54 cents $5\frac{1}{2}$ mills be reduced to a fraction of a dollar.

54 cts. $5\frac{1}{2}$ mls.
10
——
540
$5\frac{1}{2}$
——
$545\frac{1}{2} = \frac{1091}{2}$ mills.

But as it takes 1000 mills to make a dollar, multiply the denominator 2 by 1000, which will give for the *answer*, $\frac{1091}{2000}$.

Let the pupils now do the following sums by themselves:

1) Reduce $\frac{1}{2}$ of a dollar to cents.
2) Reduce $\frac{5}{8}$ of a dollar to cents and mills.
3) Reduce $\frac{1}{6}$ of a dollar to cents and mills.
4) Reduce $\frac{5}{6}$ of a dollar to cents and mills.
5) Reduce $\frac{5}{7}$ of a dollar to cents and mills.
6) Reduce $\frac{3}{4}$ of a dollar to cents.
7) Reduce $\frac{9}{10}$ of a dollar to cents.
8) Reduce $\frac{5}{9}$ of a dollar to cents and mills.
9) Reduce $\frac{1}{3}$ of a pound to shillings and pence.
10) Reduce $\frac{2}{3}$ of a pound to shillings and pence.
11) Reduce $\frac{7}{8}$ of a pound to shillings and pence.
12) Reduce $\frac{9}{10}$ of a pound to shillings and pence.
13) Reduce $\frac{4}{5}$ of 1 lb. Troy weight to oz. pwts. and grains.
14) Reduce $\frac{3}{5}$ of 1 cwt., avoirdupois, to lbs. oz. and drams.
15) Reduce $\frac{3}{7}$ of a pipe of wine to hhds. gals. qts. and pts.
16) Reduce $\frac{4}{5}$ of a quarter to bush. gals. and qts.
17) Reduce $\frac{3}{5}$ of an Ell French to qrs. and nails.
18) Reduce $\frac{4}{5}$ of a yard to qrs. and nails.
19) Reduce $\frac{4}{7}$ of a year to days, hours and minutes.
20) Reduce $\frac{3}{8}$ of a month to weeks and days.
21) Reduce $\frac{3}{4}$ of 1 hour to minutes.
22) Reduce $\frac{1}{2}$ a minute to seconds.
23) Reduce $\frac{3}{4}$ of a day to hours.
24) Reduce $\frac{3}{8}$ of a mile to furlongs, poles and feet.
25) Reduce 45 cents to a fraction of a dollar.
26) *Reduce* 3 cents 5 mills to a fraction of a dollar.

27) Reduce 63 cents ¾ mills to a fraction of a dollar.
28) Reduce 17 shillings to a fraction of £1.
29) Reduce 16*s.* 6*d.* to a fraction of £1.
30) Reduce 14*s.* 8*d.* 3*f.* to a fraction of £1.
31) Reduce 19*s.* 4½*d.* to a fraction of £1.
32) Change 3 oz. 5 pwts. 3 grs. to a fraction of 1 lb. Troy.
33) Change 3 qrs. 2 nails to a fraction of a yard.
34) Change 1 hhd. 34 gals. 3 qts. to a fraction of a pipe.
35) Change 3 gals. 2 qts. to a fraction of a barrel of beer.
36) Change 14½ bushels to a fraction of a chaldron.
37) Change 3 qrs. 24 lbs. avoirdupois to a fraction of 1 cwt.
38) Change 2 qrs. 25 lbs. 14 oz. to a fraction of a ton.
39) Change 7 furlongs 40½ rods to a fraction of a mile.
40) Change 1 rood 17¾ perches to a fraction of 1 acre.
41) What part of a year are 45 days 7 hours?
42) What part of a year are 147 days 3 hours 15 minutes?
43) What part of 1 month are 3 weeks 4 days?
44) What part of 1 hour are 25 minutes?
45) What part of 1 minute are 35 seconds?
46) What part of $1 are 34 cents 5¾ mills?
47) What part of £1 are 4*s.* 6½ pence?
48) What part of 1 hhd. are 35 gals. 3 qts.?

SECTION IV.

Formation, Numeration, Addition, Subtraction, Multiplication and Division of Decimals.

A. CHANGING VULGAR FRACTIONS INTO DECIMALS.

Rule. A decimal fraction is formed when the numerator of a vulgar fraction is divided by its denominator. The *successive figures* in the answer are considered as tenth, hundredth, thousandth, and so on, as will be seen from the following

Example. Let it be proposed to change $\frac{3}{7}$ into a decimal fraction.

```
30 : 7 = 0.4285714, &c.
28
——
 20
 14
 ——
  60
  56
  ——
   40
   35
   ——
    50
    49
    ——
     10
      7
     ——
      30, &c.
```

Then, dividing 3 by 7, we say, 7 into 3 is contained no times; wherefore, we mark off 0. for the integers of this fraction. Then, reducing the three units to tenths, by adding a cypher, (30 tenths being equal to 3 units,) we say, 7 into 30 tenths 4 times; and reducing the remaining 2 (tenth) to hundredth, by adding another cypher, 7 into 20 *twice*, and 6 hundredth over. Reducing these again to thousandth, by adding a cypher, we say, 7 into 60 (thousandth) 8 times, and so on.

Remark. It is easily seen, that when the denominator of the fraction, which is to be changed into decimals, is not entirely composed of factors 2 and 5, the division will continue forever; but the successive quotients become smaller and smaller, viz: hundredth, thousandth, ten thousandth, hundred thousandth parts, &c. In most cases, however, it will be sufficient to find three or four decimals, without any reference to the remainder.

Let the pupil now change the following fractions into decimals:

1) $\frac{1}{2}$ 6) $\frac{2}{5}$ 11) $\frac{6}{7}$ 16) $\frac{17}{20}$ 21) $\frac{15}{17}$
2) $\frac{3}{4}$ 7) $\frac{5}{25}$ 12) $\frac{8}{9}$ 17) $\frac{17}{125}$ 22) $\frac{19}{1365}$
3) $\frac{7}{8}$ 8) $\frac{2}{3}$ 13) $\frac{9}{10}$ 18) $\frac{7}{800}$ 23) $\frac{17}{30000}$
4) $\frac{13}{16}$ 9) $\frac{5}{6}$ 14) $\frac{11}{12}$ 19) $\frac{1}{100000}$ 24) $\frac{47}{71000000}$
5) $\frac{17}{18}$ 10) $\frac{19}{20}$ 15) $\frac{21}{25}$ 20) $\frac{347}{6740}$ 25) $\frac{1}{300000}$

B. ADDITION OF DECIMALS.

Rule. Be careful to write units under units, tens under tens, &c; and with regard to the decimal fractions, observe the same rule, viz: write tenths under tenths, hundredths under hundredths, &c, and proceed to add them as in common addition, observing to put the decimal point in the same place where it has been before.

Example.
34.35
5.075
417.5
0.0074
5.798

Ans. 462.7304

The pupils may now do the following sums in Addition:

1) Add 0.857
0.678

2) 1.007
2.346

3) 0.00076
13.795

4) 0.5
0.75
0.745

5) 0.000047
0.0047
0.039
0.54
0.6

6) 45.0047
5.3414
0.0047
0.0004
0.00057

7) 12.0134
196.785
7.00006
4.78
0.6

8) 0.0094
0.674
5.19
14.374
9.01

9) 7.345
8.26
37.534
19.0005
10.94
103.729

10) 7.6
138.05934
15.4
10.76
0.3592176
1365.7
37.6483
0.005

11) 19.3576
17.2340
7652.007
0.5
39.069534
7.83
5.69784
2.350006

12) 113.67849
76.859
9.7
5
152.6043
7.85976
9.437
8.65
7.94

13) 140.37
47.067
46
3.17
0.453
0.0001
0.00005
14.35

14) 45.84757
30.3464
29.373
14.57
10.7
9

C. SUBTRACTION OF DECIMALS.

Rule. Place the two numbers as in addition, and subtract as if they were all whole numbers, observing to place the point where it was before, as in addition. But if there should not be enough decimal figures in the mixed (the upper numbers,) then add as many cyphers as are necessary to perform the subtraction.

Example.
From 45.7000
Take 3.9857

Ans. 41.7143

Suppose we had to subtract 3.9857 from 45.7. Then, because there are 3 more decimals in the lower number than in the upper, annex three cyphers to the number 45.7 and subtract as usual.

(The cyphers at the end of the decimal fraction do not increase it, since they are equivalent to *no* hundredth, *no* thousandth, *no* ten thousandth, &c.)

Let the pupils now do the following sums:

1) From 1.64
Take 0.32

2) From 4.34
Take 3.734

3) From 0.5
Take 0.0047

4) From 17.34
Take 8.0047

5) From 80
Take 4.75

6) From 0.347
Take 0.00057

7) From 1
Take 0.457

8) From 3
Take 0.491

9) From 0.947
Take 1.195

10) From 9.567
Take 8.078

11) From 213.5734
Take 87.6572

12) From 54.763
Take 0.921

13) From 73.5673
Take 12.889

14) From 54.766
Take 9.999

15) From 27,003
Take 7.6853

16) From 0.975
Take 0.483764

17) From 23.005
Take 4.76943

18) From 96.5
Take 0.000783

19) From 0.5
Take 0.0003

D. MULTIPLICATION OF DECIMALS.

Rule. Write your multiplier under your multiplicand, and multiply as if they were whole numbers. Then, from the product, mark off as many decimals as there are in the multiplier and multiplicand taken together. In the same manner, may a decimal fraction be multiplied by a whole number, or a whole number by a decimal fraction. If there should not be enough figures in the answer to mark off the decimals according to the rule just given, then add on the left side of your answers as many cyphers as is necessary to do so. To give an

Example.
0.0045
0.0032
90
135
Ans. 0.00001440

Suppose it were required to multiply the decimal fraction 0.0045 by 0.0032. Then write them under one another, and multiply the significant figures 45 and 32 as usual; and to their product, 1440, which ought to consist of 8 decimals, (because multiplier and multiplicand have each four,) add as many cyphers on the left as is necessary to mark off eight decimals.

Let the pupils now do the following sums:

1) Multiply 3.57
by 6

2) Multiply 5.798
by 18

3) Multiply 0.5
by 36000

4) Multiply 0.00563
by 17

5) Multiply 0.0000054
by 3785

6) Multiply 3.7
by 2.6

7) Multiply 5.78
by 3.4

8) Multiply 3.9765
by 4.378

9) Multiply 32.76859
by 13.0076

10) Multiply 138.5
by 7.695708

11) Multiply 0.43
by 0.65

12) Multiply 0.576
by 0.3854

13) Multiply 0.005
by 0.017

14) Multiply 0.007853
by 0.00476

15) Multiply 113.5
by 0.072

16) Multiply 0.372016
by 0.0054

17) Multiply 0.137
by 0.00056

18) Multiply 0.0076894
by 0.376

19) Multiply 0.000001
by 0.001

20) Multiply 0.00405
by 0.0743

21) Multiply 0.005
by 0.50505

22) Multiply 0.3001
by 0.001

E. DIVISION OF DECIMALS.

Rule. Make the number of decimals in divisor and dividend equal, by adding to either of them as many cyphers on the right, as are necessary for that purpose, and divide them afterwards as if they were whole numbers.

Example.
$0.05 : 3 = 5 : 300$
300)500(0.01
300
——
200, &c.

Suppose it were required to divide 0.05 by 3. Then this is just the same as 0.05 divided by 3.00 or 5 : 300. Then you say, 300 into 5 no times, and mark your decimal point. Again, having annexed a cypher, you say, 300 into 10 tenths no tenth of times. Finally, after having brought down another cypher, 300 into 500 go once, &c.

When your divisor contains several cyphers at the end, you may, instead of adding a cypher to the dividend, strike out a cypher in the divisor.

Another Example. Divide 4.05 into 40.645. This is just the same as dividing 4.050 into 40.645. Hence,

4050)40645(10.03
4050
——
14500
12150
——
2350, &c.

The pupils may now do the following sums:

1) Divide 5.64 by 2.
2) Divide 7.5832 by 8.
3) Divide 0.357642 by 6.
4) Divide 0.32769414 by 18.
5) Divide 75.0 by 16.
6) Divide 7.31 by 8.
7) Divide 3.54 by 7.
8) Divide 3.59 by 8.

9) Divide 8.2356 by 17.
10) Divide 273.694 by 543.
11) Divide 6938.57 by 276.
12) Divide 0.000215 by 316.
13) Divide 400 by 0.25.
14) Divide 378 by 0.01.
15) Divide 5640 by 0.0015.
16) Divide 183260 by 0.476.
17) Divide 1 by 0.24.
18) Divide 2.53944 by 7.2.
19) Divide 0.02382245 by 0.37.
20) Divide 1114.869145005 by 0.385.
21) Divide 56.4 by 0.00015.
22) Divide 10287.36 by 0.0036.
23) Divide 0.0001 by 0.02.
24) Divide 145.817 by 0.0563.
25) Divide 374 by 2.4.
26) Divide 15.713 by 18.13.
27) Divide 137.51634 by 27.65.
28) Divide 0.5 by 76.91342.
29) Divide 0.046 by 0.00762089.
30) Divide 1. by 3.2561047.
31) Divide 38076 by 137.
32) Divide 0.0456 by 0.0001.
33) Divide 0.003 by 0.0034.
34) Divide 0.5 by 0.005.
35) Divide 0.1 by 1.1.
36) Divide 0.001 by 100.

F. REDUCTION OF DECIMALS.

Rule. When the reduction is descending, then multiply the decimal fraction by as many as will make one of the next lower denomination, observing to cut off the same *number of decimal* figures in the product as we have in the ed fraction. The remaining decimal fraction may be reduced to units of the next lower denomination, ltiplying it by as many as will make one of that deation; and so on.

Example.

0.635
20
———
18.700
12
———
8.400
4
———
1.600
Ans. 18*s.* 8*d.* 1.6*f.*

Suppose we were to reduce 0.635 of a pound to shillings and pence. Then, because 20 shillings make 1 pound, multiply 0.635 by 20 — and cutting off three decimals, we have 18.7 shillings for the answer. Reducing the 0.7 of a shilling again to a fraction of pence, multiply 0.7 by 12, because 12 pence make 1 shilling — the answer is 8.4; and multiplying that answer again by 4, because 4 farthings make 1 penny, we obtain 1.6 farthings; so that the whole answer is 18*s.* 8*d.* 1.6 farthings.

Rule II. If a decimal fraction of a lower denomination is to be reduced to one of a higher denomination, then divide it by as many as will make one of the denomination to which you have to reduce it. The same rule applies to a whole number with a decimal fraction.

Example.

240)0.750(0.003125
720
———
300
240
———
600
480
———
1200
1200
———

Suppose it were proposed to reduce the decimal fraction 0.75 of a penny to a fraction of a pound.— Then, because it takes 240 pence to make £1, divide 0.75 by 240. The answer is 0.003125 of £1.

Let the pupils now do the following sums:

1) Reduce 0.34 of £1, to shillings and pence.

2) Reduce 0.75 of a ton, to cwts. and quarters.

3) Reduce 0.345 of 1 lb. Troy, to oz. pwts. and grai

4) Reduce 0.25 of 1 yard, to quarters.
5) Reduce 0.345 of 1 year, to days, hours and minutes.
6) Reduce 0.5 of a week, to days and hours.
7) Reduce 0.725 of an acre, to roods and perches.
8) Reduce 6.028 of a mile, to rods, yards and feet.
9) Change 0.46 of a penny, to a decimal fraction of £1.
10) Change 0.5 of a cent, to a decimal fraction of $1.
11) Change 0.75 of a pound, to a decimal fraction of 1 cwt.
12) Change 0.25 oz. Troy, to a decimal fraction of a pound.
13) Change 14.75 lbs. to a decimal fraction of 1 cwt.
14) Change 33.33 cents to a decimal fraction of $1.
15) Change 7.44 pence to a decimal fraction of £1.
16) Change 5.25 shillings to a decimal fraction of £1.

PROMISCUOUS EXERCISES IN FRACTIONS.

A. EXERCISES IN VULGAR FRACTIONS.

1. What will $3\frac{3}{4}$ pounds of tea come to, at $14\frac{1}{2}$*d*. per lb.? (Find the shillings and pence of the answer.)

2. What is the price of $13\frac{4}{5}$ oz. of silver, at $\$1\frac{1}{4}$ per oz.?

3. What is the price of $7\frac{1}{2}$ cwt. of sugar, at $\$13\frac{1}{2}$ per cwt.?

4. Bought $17\frac{1}{2}$ bls. of flour, at $\$5\frac{3}{4}$ per bl. What was the cost?

5. What is the price of $7\frac{7}{8}$ yards of cloth, at £$1\frac{3}{4}$ per yd.?

6. What is the value of $14\frac{3}{5}$ hhds. of wine, at $\$17\frac{1}{2}$ per hhd.?

7. What will $13\frac{3}{4}$ cords of wood come to, at $\$7\frac{3}{8}$ per cord?

8. What is the price of $\frac{3}{4}$ hhds. of beer, at $7 per hhd.?

9. What is the price of $3\frac{1}{2}$ tons of lead, at $19 per ton?

10. What will 16 chaldrons of coal come to, at £$5\frac{1}{12}$ per chaldron?

11. What is the cost of $14\frac{3}{4}$ bushels of wheat, at $2\frac{1}{2}$ *shillings per* bushel?

12. What is the cost of 14 lbs. of sugar, at 19¾ pence r lb.?

13. Bought 15 tons of coal, at £1 14¾*s*. per ton. What as the price of the whole?

14. Bought 7 hhds. of tobacco, at $64 43½ cents per hd. What was the cost of the whole?

15. Sold 14 tons of hay, at $7⅘ per ton. What was the price of the whole?

16. Sold 7 hhds. of molasses, at 37½ cents a *gallon*.* What was the price of the whole?

17. Sold 4 lbs. 7 oz. 13 pwts. of wrought silver, at 19½ cents per pwt. What did the whole come to?

18. What is the cost of 14 hhds. 13½ gallons of wine, at $2½ per gallon?

19. Bought 3 hhds. 45¾ gals. of wine, at $1⅞ per gal. What is the price of the whole?

20. Sold 14 yards 3½ quarters, at 14½ cents per qr. What was the price of the whole?

21. Bought 1 hhd. of molasses, for $28¾. What was this a gallon? †

22. Sold 3 qrs. 14 bushels of wheat, for $19 15¾ cents. What was this a bushel?

23. Sold 4¾ cords of wood for $22½. What was this a cord?

24. Sold 7½ tons of iron, for $9 62½ cents per ton. What was this a pound?

25. Bought 14¾ yards of broadcloth, for £15¾. What was this a yard in pounds, shillings and pence?

26. Bought 17⅘ yards of cotton, for 10*s*. 6½*d*. What was this a yard?

27. Bought 20¾ yards of calico, for 14 shillings 6*d*. What was this a yard?

28. Bought 19 bushels of potatoes, for $9½. What was this a bushel?

---

* *Reduce the* hogsheads first to gallons, and then multiply.

† *Reduce the* hogshead to gallons, and divide into the 18¾ dollars.

29. Sold 29½ barrels of beer, for $88½. What was this a barrel?

30. $46⅞ are to be divided among 3 persons. What is the share of each?

31. $145⅗ are to be shared equally among 5 persons. What is the share of each?

32. What is the 12th part of £475 12¾*s.*?

33. What is the 25th part of £74⅞?

34. I have on hand 144½ lbs. of sugar, for which I wish to get $12 28¼ cents. What must I sell a pound for?

35. Paid $2639 for a lot of land measuring 23½ feet by 14¼. What was this a square foot?

36. Bought a farm measuring 340½ rods in length, and 47½ in breadth, and paid for it $10108 12⅞ cents. How much was this a square rod? * How much was it an acre? †

37. I once bought 3 yards of cloth, at $4½ a yard; 13½ yards of tape, at 3½ cents a yard; 14 bushels of wheat, at 50¾ cents per bushel; and 2 bushels of rye at 37½ cents per bushel. What did the whole amount to?

38. Sold 14½ lbs. of sugar, at 8½ cents a pound; 13¾ lbs. of coffee, at 13½ cents per lb.; 25 lbs. of almonds, at 16⅔ cents per lb.; and 3 gallons of molasses, at ½ a dollar per gallon. What did the whole amount to?

39. Bought 14½ barrels of beer, at $2¾ per barrel; 17¾ lbs. of sugar, at 16⅔ cents per lb.; 10 boxes of raisins, at $2 62½ cents per box; and 12 dozen of cider, at $1¾ per dozen. What was the amount of my bill?

40. Shipped 14 bales of cotton, at £19½ sterling; 3½ hhds. of tobacco, at £12 10*s.* 6½*d.* per hhd.; 300 barrels of flour, at £1 9½*s.* per barrel; and 5 tons of rice, at 1 penny per lb. What was the amount of the whole?

41. Bought 14 yards of linen, at 62½ cents per yard;

---

* Multiply 23½ by 14½, and divide into 2639.

† Multiply the answer for 1 square rod by 40.

144 yards of tape, at 3½ cents per yard, and paid the shopkeeper $10. How much change must he return me?

42. Sold 14⅘ yards of cloth, at $3 53½ cents per yard, but bought of the same man 10 dozen of wine, at $2¾ per dozen. How much money does he still owe me?

43. I owe to my friends in England, £547 19*s*. 6½*d*. sterling, but have shipped them 2000 lbs. of tobacco, at 6½ pence per lb. How much do I still owe them?

44. A man owes me $45 75 cents, but having never been able to pay me this sum at once, he paid me at one time $3½, at another $10¼, then again $13¼; finally, he sold me 16½ lbs. of tea, at $¾ per lb. How much does he still owe me?

45. Being obliged to take a journey of 1000 miles, I set out, and intend to travel 20 days on foot, walking each day 22½ miles; then I mean to ride on horseback 25¾ miles, daily, for 10 days; after which I mean to take the stages, to carry me to the end of my journey. How many miles shall I have to ride in the stage? How many days shall I have to ride in the stage if we make 30⅞ miles daily?

46. How many sheets of paper shall I write in a week, if on Monday I write 3½ sheets, on Tuesday 4¾, on Wednesday 7⅛, on Thursday 5¼, on Friday 6¾, and on Saturday 1⅓ sheets?

47. I owe a gentleman in England £400 sterling. How many dollars must I remit him, reckoning $4½ to a pound sterling?

48. I owe a gentleman in Paris 5000 francs. How many dollars and cents must I remit him, reckoning 19½ cents to a franc?

49. Having bought some German dry goods in Hamburg, I wish to remit cash for them. The goods cost 4734 mark-banco. How many dollars and cents will it take to pay for them, reckoning 37½ cents to one mark-banco?

50. Owing a man in Amsterdam 569½ Dutch guilders, I *shipped to him* $446¾ worth of American raw produce. *Now if a Dutch* guilder is only worth 39¾ cents, how

many dollars and cents will he owe me after receiving my goods? *

51. Shipped to Rio de Janeiro 145 barrels of flour, at $6½ per barrel, but received in return 400 boxes of sugar, at $8½ per box. What is the amount I still owe? How many dollars (Federal money) will it take to pay him, if the Brazilian dollar is only worth 87½ cents?

52. To how many pounds sterling are $1000 equal, reckoning $4½ to £1?

53. To how many francs are $1000 equal, reckoning 18¾ cents to 1 franc?

54. To how many marks-banco are $1000 equal, counting 37½ cents to 1 mark-banco?

55. To how many Dutch guilders are $1000 equal, calling 38¾ cents 1 Dutch guilder?

56. To how many rix dollars are $1000 equal, calling a rix dollar 80½ cents?

57. To how many Frankfort guilders are $1000 equal, reckoning 39½ cents to a guilder?

58. By how much are £1000 sterling, at $4½ per pound, more than $1000?

59. By how much do $1000 exceed 1000 francs, reckoning 19½ cents to 1 franc?

60. By how much do $1000 exceed 1000 Dutch guilders, at 38¾ cents per guilder?

B. EXERCISES IN DECIMAL FRACTIONS.

1. Bought 14.75 cwt. of sugar, at $5.755 per cwt. What is the whole amount?

2. Bought 14.345 oz. of silver, at 23.5 cents per ounce. What did the whole amount to?

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* Multiply 569½ by 39¾, and subtract the product, (after having reduced it to dollars,) from $446¾.

3. Sold 14 bushels of potatoes, at 62.5 cents per bushel; 3 bags of coffee, at $15.625 per bag; and 14½ barrels of flour, at $5.50 per barrel. What was the whole amount?

4. Sold 40 lbs. of sugar, at 16.66 cents per lb.; 13 lbs. of raisins, at 22.5 per lb.; 14 lbs. of almonds, at 16.33 per lb.; and 15 lbs. of beef, at 12.5 per lb. What was the amount of the whole?

5. Bought 135 lbs. of butter, at 23.5 cents per lb., but sold it again at 25 cents per lb. What did I gain in the bargain?

6. Bought 45.2 yards of cloth, at 7.555 per yard, but sold it again for $9.50 a yard. What is the amount of my profit?

7. Bought 170 yards of broadcloths, at $4.75 cents a yard, but sold them again at auction, at $3.25 a yard. What is the amount of my loss?

8. Bought 14½ hhds. of wine, at $41.333 per hhd., and sold them again at auction, when they brought only $40.50 a hhd.: my expenses, taxes, &c, amounted to $30.50. What is the whole amount of my loss?

9. Bought 4460 yards of American cotton, at 14½ cents per yard, which I shipped to Canton, where it brought 15¾ cents per yard: paid freight $5.40. What is my clear profit?

10. 12 gentlemen are to share a clear gain of $154.095. What is the share of each?

11. 341 paupers are to divide among themselves $344.41. What is each one's share?

12. Bought 14 boxes of sugar, for $43.75. What was this a box?

13. Bought 19 bls. of flour, for $71.25. What was this a barrel?

14. Sold 29 bags of coffee, for $15.12. What was this a bag?

15. Sold 5 dozen of Madeira, for $47.50 How much *was this a* dozen? How much a bottle?

16. Bought 140 boxes of sugar, for $420. What must I sell a box for, to gain a dollar on each box?

17. Bought 65 bls. of flour, at $5.50, but paid only $300 in cash, and the rest in potatoes at 50 cents a bushel. How many bushels will it take to pay what I still owe?

18. Sold 26 hhds. of tobacco, at $65.50 per hhd., and sold the whole lot again for $1755. What was my gain per hhd.?*

19. Sold 44 bushels of wheat, for $27.50, which I had paid only 50 cents a bushel for. How much did I gain on each bushel?

20. Bought 5 dozen of wine, at $10 per dozen, but sold them again at $11.75 per dozen. What is my gain in the whole bargain?

21. How many barrels of flour at $5.50 must I give for 40 yards of broadcloth, at $11 a yard?

22. How much wheat at 50 cents a bushel, must I give for 120 bushels of rye, at 37½ cents per bushel?

23. How many dozen of cider, at $1.75 per dozen, must I give for 40 dozen of claret, at $3.50 per dozen?

24. How many barrels of ale, at $4.25 per barrel, can I buy for 80 bls. of beer, at $4 a barrel?

25. How many bales of cotton, at $30.75 a bale, must I give for 40 hhd. of sugar, at $65.50 per hhd.?

26. How much coffee, at 13½ cents per lb., must I give for 125 lbs. of almonds, at 20 cents a pound?

27. How many dollars and cents must I give for £1000 sterling, at $4.444 per pound?

28. What is the value of $1000 in pounds sterling, at $4.444 per pound?

29. By how many dollars and cents do 30000 francs exceed the value of £1000 sterling, in this country, where

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* Find first the price of the 26 hhds., which, subtracted from $1755, will give you the whole gain. This you must again divide by 26, to get the gain per hhd.

the franc is valued at 18¾ cents, and the pound sterling at $4.444?

30. By how many dollars and cents do 2600 Dutch guilders exceed the value of 2500 Hamburg marks-banco, in this country, where the Dutch guilder is valued at 40 cents, and the Hamburg mark-banco only 33½ cents?

SECTION V.

Containing Exercises in those Compound Rules of Arithmetic, which are most frequently employed in business and the common purposes of life.

A. INTEREST.

Interest is an allowance paid by a debtor to his creditor for the use of money, which is always averaged so much for each hundred dollars or pounds received for the term of one year. Hence by saying, I lend money at 6 per cent, is meant, I lend money on condition that when it is returned me, I am to receive additional 6 dollars for each hundred dollars I lent, and for a smaller sum in proportion, per annum, that is, for the space of one year; so that if the money were not returned until the end of 2 years, I am to receive double this sum, and for 3 years three times the amount of interest of 1 year; and so on.

Rule I. If the interest is to be calculated for several years, multiply the amount of money (which is called the principal) by the rate of per cent, and divide by 100. The answer will be the interest of the money for one year. From this answer it is afterwards easy to find the interest of one or several months; as follows,

For 1 month,	the interest is	$\frac{1}{12}$th	of 1	year's int.
For 2 months	"	$\frac{1}{6}$	"	"
For 3 months	"	$\frac{1}{4}$	"	"
For 4 months	"	$\frac{1}{3}$	"	"

For 5 months the interest is $\frac{1}{3}$, and $\frac{1}{4}$ of $\frac{1}{3}$ of 1 year's interest. Or, also, $\frac{5}{12}$ of 1 year, which is found by dividing 1 year's interest by 12, and multiplying the quotient by 5.

For 6 months the interest is $\frac{1}{2}$ of 1 year's interest.
For 7 months " $\frac{1}{2}$ and $\frac{1}{6}$ of $\frac{1}{2}$ of 1 year's interest. Or, also, $\frac{7}{12}$ of 1 year.
For 8 months " $\frac{2}{3}$ of 1 year's interest.
For 9 months " $\frac{3}{4}$ of 1 year's interest.
For 10 months " $\frac{5}{6}$ of 1 year's interest.
For 11 months " $\frac{11}{12}$ of 1 year's interest.

Example. What is the interest of $1000 for 1 year at 6 per cent? What that of 1 month, 2 months, 3 months, &c?

$$\begin{array}{r} 1000 \\ 6 \\ \hline \end{array}$$

100)60.00($60 is the interest for 1 year.

$\frac{1}{12}$ of $60 - - - = $5, is the int. for 1 mon.
$\frac{1}{6}$ of 60 - - - = $10, " " 2 "
$\frac{1}{4}$ of 60 - - - = $15, " " 3 "
$\frac{1}{3}$ of 60 - - - = $20, " " 4 "
$\frac{1}{3}$ of 60 = 20, and $\frac{1}{4}$ of 20 = 5 = $25, " " 5 "
$\frac{1}{2}$ of 60 - - - = $30, " " 6 "
$\frac{7}{12}$ of 60, or $\frac{1}{2}$ of 60 & $\frac{1}{6}$ of 30 = $35, " " 7 "
$\frac{2}{3}$ of 60 - - - = $40, " " 8 "
$\frac{3}{4}$ of 60 - - - = $45, " " 9 "
$\frac{5}{6}$ of 60 - - - = $50, " " 10 "
$\frac{11}{12}$ of 60 - - = $55, " " 11 "

II. If the interest is to be cast for an odd number of *days*, it is found by dividing the interest of 1 month by 30, (which will give you the interest for 1 day,) and multiplying by the number of days you have to find the interest on.

III. If the interest at 6 *per cent* is to be calculated for an odd number of days, it is easily done by the following rule:

Divide the amount of dollars by 60, and multiply by the number of days: the product will be the answer in cents.

Proof. Each dollar brings in a month, (at 6 per cent,) $\frac{1}{2}$ cent interest; consequently, in 1 day $\frac{1}{30}$ of $\frac{1}{2}$, or $\frac{1}{60}$ of a cent — which is of course taken as many times as there are dollars, and this again as many times as there are days.

Example. Suppose it were required to find the interest on $4500 for 79 days.

```
6|0)450|0(75
          79
        ----
         675
        525
     -------
     $55.29
```

The dividing 4500 by 60, you obtain 75 cents, which is the amount of interest for 1 day; and multiplying this by 79, you get the interest at 6 per cent for 79 days.

Let the pupils now do the following sums:

1) Find the interest of $450, at 6 per cent, for 1 year.
2) Find the interest, at 6 per cent, of $154.75, for 3 years.
3) Find the interest, at 6 per cent, of $345.50, for 4 years.
4) Find the interest, at 6 per cent, of $1746.75, for 10 years.
5) Find the interest, at 5 per cent, of $4674, for 20 years.
6) Find the interest at 4 per cent, of $4764, for 23 years.
7) Find the interest at 6 per cent, of $3470.75, for 6 months.
8) Find the interest, at 6 per cent, of $1094.65, for 9 months.
9) Find the interest, at 6 per cent, of $3447.70, for 8 months.
10) Find the interest, at 5 per cent, of $3750.50 for 4 months.
11) Find the interest, at 6 per cent, of $2000.50, for 1 month.
12) Find the interest, at 8 per cent, of $3500, for 1 month.
13) Find the interest, at 7 per cent for 3 months, of $3470.
14) Find the interest, at 4 per cent for $4\frac{1}{2}$ months, of $500. (Find first the interest of 4 months, or $\frac{1}{3}$ of a year, *and then* take $\frac{1}{8}$ of that for the half month.)
15) *Find the* interest, at 6 per cent for 11 months, of $745.

16) What is the interest, at 6 per cent, of $400, for 73 days?

17) What is the interest of $1289.33, at 6 per cent, for 31 days?

18) What is the interest of $300, at 6 per cent, for 45 days?

19) What is the interest of $156.54, at 5 per cent, for 37 days?

20) What is the interest of $374.36, at 3½ per cent, for 89 days?

21) What is the interest of $399.98, at 5¾ per cent, for 105 days?

22) What is the interest at 6 per cent, of $1000, from October 1st, 1832, to July 1st, 1833?

23) What is the interest at 6 per cent, on $3470.70, from October 15th, 1831, to January 1st, 1834?

24) What is the interest at 4 per cent, of $734.75, from July 20th, 1833, to August 1st, 1834?

25) What is the interest of $740.44, at 5 per cent, from August 10th, 1833, to October 30th, 1834?

26) What is the interest at 8 per cent, on $987.34, from August 16th, 1833, to October 28th, 1833?

27) What is the interest at 3½ per cent, on $1000, from September 1st to October 14th, 1835?

28) What is the amount of interest on $60000, at 6 per cent, from the 10th of September, 1832, to the 1st of October, of the same year?

29) What is the interest at 6 per cent, on $1340, from the 1st of August till the 3d of Sept., of the same year?

30) What is the interest at 6 per cent on $3474.28, from the 10th of November till the 3d of January following?

Remark. When the interest at 6 per cent is to be calculated for a number of months and days, then you may multiply your principal by half the number of months for your unit-figure, and ⅙ part of the number of days for your decimals.

Example. Suppose you were to find the interest at 6 per cent of $1000, for 4 months and 13 days.

1000
2.216
2216.000
ANS. $22.16

Then multiply the principal by 2.216, which we obtain by taking half of 4 months for the unit figure, and $\frac{1}{6}$ of 13 for the decimals; we get 2216.000 for our product, which, divided by 100, gives the interest $22.16.

The reason why you have a right to do so, is because 2 months being $\frac{1}{6}$ of a year, are, at the rate of 6 per cent, equal to 1 per cent; consequently, half the number of months will be the unit figure of your multiplier: and because every 6 days are $\frac{1}{10}$ of 2 months, (the months being calculated at 30 days,) they must also give $\frac{1}{10}$ per cent; consequently the 6th part of the days will be tenth of your multiplier or your decimals.

Let the pupils do the following sums for practice:

1) What is the interest on $450, at 6 per cent, for 10 months and 18 days?
2) What is the interest on $137 45, at 6 per cent, for 8 months and 27 days?
3) What is the interest on $634 94, at 6 per cent, for 5 months and 6 days? *
4) What is the interest on $1444 44, at 6 per cent, for 3 months and 24 days?
5) What is the interest on $2347 33, at 6 per cent, for 4 months and 17 days?
6) What is the interest at 6 per cent, on $37400, for 8 months and 27 days?
7) What is the interest at 6 per cent, on $10000, for 9 months and 20 days?
8) What is the interest at 6 per cent, on $100,000, for 10 months and 18 days?
9) What is the interest at 6 per cent, on $12000, for 11 months and 24 days?
10) What is the interest at 6 per cent, on $30000, for 7 months and 3 days?

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* *Your multiplier* will be 2 for half of the 5 months, and 6 for the *remaining 36 days.*

11) What is the interest at 6 per cent, on $45000, for 8 months and 1 day?

12) What is the interest at 6 per cent, on $30000, for 9 months and 10 days?

INTEREST ON BRITISH MONEY.

The lawful interest in England being 5 per cent per annum, or, which is the same, $\frac{1}{20}$ of the principal, it will be easy to find the interest of any sum of English money by the following

Rule I. Take the pounds of your principal for your interest in shillings, (each shilling being just $\frac{1}{20}$th of £1,) and if there are any shillings and pence of which the interest remains to be taken, reduce them all to pence, and take one half of the sum, neglecting the last figure on the right; for this amounts to dividing by 20: (taking the half is the same as dividing by 2; and leaving out the last figure on the right, is the same as dividing by 10.)

Example. Find the lawful interest of £475 17*s.* 6*d.* sterling, for 1 year.

£475 17*s.* 6*d.*
Ans. { 475 shillings, or
£23 15*s.*
17
12
——
2)210
——
10½ pence.
Whole answer,
£23 15*s.* 10½*d.*

Then 475 shillings are the interest in shillings of the pound. These, divided by 20, give £23 15*s.* for the first part of the answer. The remaining 17*s.* 6*d.* being reduced to pence, give 210 pence; which, divided by 2 and neglecting the 0 on the right hand, give 10½ pence for the interest on 17*s.* 6*d.* The whole answer, therefore, is £23 15*s.* 10½ pence.

Let the pupils now do the following easy sums:

1) Find the lawful interest, at 5 per cent, of £450 17*s.* 6*d.* for 1 year?

2) Find the lawful interest of £325 10*s.* 3*d.* for 1 year.

3) Find the lawful interest of £175 15*s.* 6*d.* for 1 year.

table, it is only necessary to multiply the principal by it, to obtain at once the amount of principal and interest for a given number of years. Such a table, calculated as far as 20 years, at the rate of 6 and 5 per cent, is here exhibited for the inspection and use of the learner.

Number of Years.	Whole amount at 5 per cent.	Whole amount at 6 per cent.	Number of Years.	Whole amount at 5 per cent.	Whole amount at 6 per cent.
1	1.05000	1.06000	11	1.71034	1.89829
2	1.10250	1.12360	12	1.79585	2.01219
3	1.15762	1.19101	13	1.88565	2.13292
4	1.21550	1.26247	14	1.97993	2.26090
5	1.27628	1.33822	15	2.07892	2.39655
6	1.34009	1.41852	16	2.18287	2.54035
7	1.40710	1.50363	17	2.29201	2.69277
8	1.47745	1.59384	18	2.40662	2.85434
9	1.55132	1.68948	19	2.52695	3.02559
10	1.62889	1.79084	20	2.65329	3.20713

Now if, by the use of this table, you were to fid the amount to which $5473.74 cents would increase in 10 years, compound interest being calculated at the rate of 6 per cent, you need only multiply the number 1.79084 (which you find in the column for 6 per cent by the side of 10 years) by your principal, thus:

1.79084
5473.74

716336
1253588
537252
1253588
716336
895420

9802.5925416

The product, 9802.59 (the other decimals may be neglected) will be your amount in dollars, and consequently the answer to your question.

Let the pupils do the following sums:

1. Find the compound interest of $1475 for 5 years, *at 5 per cent.* (Find first the whole amount of principal and interest, from which subtract the original principal, $1475; the remainder will be the interest alone.)

2. Find the compound interest of $4750.75 for 10 years, at 6 per cent.

3. Find the compound interest of $1473.50 for 12 years, at 6 per cent.

4. Find the compound interest of $8344.55 for 15 years, at 5 per cent.

5. Find the compound interest of $14734 for 20 years, at 6 per cent.

6. To what sum will $1473 increase in 9 years, reckoning compound interest at the rate of 5 per cent?

7. To what sum will $4735.50 increase in 10 years, reckoning compound interest at the rate of 6 per cent?

8. To what sum will $1400 increase in 7 years, allowing compound interest at the rate of 6 per cent?

9. To what sum will $20000 increase in 10 years, reckoning compound interest at the rate of 6 per cent?

10. To what sum will $1000 increase in 20 years, compound interest being allowed at the rate of 6 per cent?

COMMISSION AND BROKERAGE.

By Commission and Brokerage is understood, the reward which a *seller* or *broker* receives for the disposal of certain properties or goods. Now as this is generally averaged in *per cents* of the whole amount of the goods or property thus disposed of,

The Rule for calculating commission and brokerage is evidently the same as that for computing simple interest.

Example. Suppose the amount of sales at auction amounted to $2350, and it is agreed by the owner of the goods that the auctioneer is to receive 5 per cent commission, including taxes and expenses for advertising, &c. What is the commission on the whole?

$$\begin{array}{r} 2350 \\ 5 \\ \hline \end{array}$$

$117.50 is the answer.

The commission, therefore, is $117.50, which it is customary to deduct from the amount of sales. The owner of the goods, therefore, would only receive

$$\begin{array}{r} 2350.00 \\ 117.50 \\ \hline \$2232.50 \end{array}$$ for the net proceeds of the sales.

The pupils may, for the sake of practice, do the following sums:

1. Sold $4750 worth of goods. What is the commission on them at the rate of 5 per cent?

2. Sold $1345 worth of dry goods. What is the amount of commission at the rate of 4½ per cent?

3. Sold 45 hhds. of sugar at $67.54 cents per hhd. What is my amount of commission, allowing 3½ per cent?

4. Sold a house for $4780, and allowed brokerage 1½ per cent. What is the net proceeds of the sale? (Deduct the discount, at 1½ per cent, from $4780.)

5. Sold 400 hhds. of wine, at $34.75 per hhd.; allowed 4½ per cent commission. What is the net proceeds of the sale?

6. Sold 434 tons of coal, at $7.50 per ton; allowed 3½ per cent commission. What are the net proceeds of the sale?

Remark. Sometimes the seller or disposer of goods at auction *guarantees the sales;* by which is meant, that he guarantees the payment of all the goods sold. It is then customary to allow the seller 1 or 1½ per cent in addition to the ordinary commission. To find the total amount of commission in this case, you need only add the per-centage allowed for the guarantee of the payments to that allowed for commission, and multiply at once by the rate of per cent thus increased. To give an

Example. Suppose it were required to find the amount of commission and guarantee on the sales of $10650 worth of goods, commission being reckoned at the rate of 4½ per cent, and 1½ per cent being additionally granted for the guarantee of payments. Then, 1½ per cent added to 4½, would make 6 per cent; which, multiplied by the amount of sales and divided by 100, would give the amount of commission and guarantee paid to the seller. Thus,

$$\begin{array}{r} \$10650 \\ 6 \\ \hline 639.00. \end{array}$$

Answer $639.

Let the pupils do the following sums for the sake of practice:

1. What is the amount of commission on $4734.75, at the rate of 6 per cent, ½ per cent being allowed for guarantee of payments?

2. What is the amount of commission on the sales of 4500 yards of broadcloth, at $9.80 per yard, commission being reckoned at the rate of 5 per cent, and the sales being guaranteed for 1½ per cent?

3. What is the commission on the sales of 400 hhds. of sugar, at $43.75, at the rate of 3½ per cent, and 2½ per cent for the guarantee of sales?

4. What are the nett proceeds from the sales of 500 hhds. of molasses, at $24.50 per hogshead — they having been sold at auction — at the rate of 4½ per cent commission, state tax 1 per cent, and 1½ per cent for the guarantee of sales? (Take the interest at 7 per cent from the whole amount; the remainder will be the nett proceeds.)

5. What are the nett proceeds of the sales of 4500 boxes of sugar, at $3.84 per box, commission being reckoned at the rate of 4½ per cent, and the sales being guarantied for ½ per cent?

6. What are the nett proceeds from the sales of 4300 barrels of flour, at $4.75 per barrel; commission being allowed at the rate of 3½ per cent, and the sales being guarantied for 1½ per cent?

PROPORTIONS AND RULE OF THREE.

The *Rule of Three* is a rule which teaches to
number which shall bear the same proportion to a
number, that a third number bears to a fourth.
therefore a rule by which we find a fourth
three given ones — hence its name. If, for instance, it
required to find a number which shall bear the same
to 6, which 4 bear to 2, then it would be easily
the number required is 12, because 12 are twice 6,
are twice 2; 12, therefore, bear the same proportion
which 4 bear to 2.

In order to obtain the number 12, we should have
the number 4 by 2, to see how many times 4 are
than 2; and by the quotient we should have
6, in order to obtain the number which is twice
6. The numbers 2, 4 and 6, are called *terms*; and
customary to set them down as follows, with the sign
tween the 1st and 2d, and the sign : : between the
3d terms; thus,

2 : 4 : : 6. Answer 12.

To obtain the answer, it is evidently only
divide the 2d term by the 1st, and to multiply the 3d
the quotient; but as the division of the 2d term by
often leads to fractions, it is better to *multiply first*
and 3d terms, and divide the product by the first term.

Applying this rule to the proposed sum, we should have

$$\frac{4\times6}{2}=\frac{24}{2}=12,\text{ for the answer.}$$

Th *Rule of Three* is of almost universal
arithmetic, and may be applied to nearly all
questions which occur in common life. To give an

Example. If the question should be asked, 'What
be the price of 10 yards of cloth if 2 yards cost $3,'
evident that the answer may be obtained by the
Three; because the question is the same as to find
which shall be to 3, (the price of 2 yards) in
proportion as 10 to 2.

Now in all such cases, the question may be stated by the following

Rule. Make the number which is of the same denomination as the answer, your second term, and reflect whether the answer sought, must, from the nature of the question, be greater or smaller than this number. If the answer must be larger than your second term, then you must make the greater of the two remaining numbers your third term, and the other your first term. But if the answer, from the nature of the question, must be smaller or less than your second term, then you must make the less of the two remaining numbers your third term, and the greater, your first term. When the question is thus stated, multiply the second and third terms together, and divide the product by the first term: the quotient is your answer.

Example. Bought 5 yards of cloth for $18.50. What will 24 yards of the same cloth come to?

yds. $. *yds.*
5 : 18.50 : : 24
24
———
7400
370
———
5)444.00(88.80
40
——
44
40
——
40
40
——
00
Answer $88.80.

Then, because the answer sought will be dollars and cents, make $18.50 (which are of the same denomination) your second term; and because the answer will evidently be greater than 18.50, (since 24 yards must cost more than 5 yards) make the greater of the two remaining numbers, 24, your third term; and 5, the smaller, your first term. When this is done, multiply the second and third terms, and divide the product, 444.00, by the first term, 5. The answer is $88.80, which you can prove by reversing the question.

Another Example. Four men can do a certain piece of work in 6 days. How many days will 8 men need for the same work?

8 : 6 : : 4 :
4
—
8)24(3
Ans. 3 days.

Then, making again the term which is of the same denomination as the answer our 2d term, we make the greater of the two remaining terms our first term, because the answer must evidently be less than 6, since 8 men will need less time to finish the same piece of work than 4 men. Making the remaining number, 4, our third term, we proceed as in the last example, and obtain 3 for the answer.

Let the pupils now do the following sums:

1. What is the price of 54 tons of lead, if 21 tons are paid for with $21.00?

2. If 14 gallons of oil are sold for $15.00, what will be the price of 5 barrels, each barrel holding 36 gallons?

3. If 100 bales of cotton cost $5400, what is the price of 5 bales?

4. If 50 gallons of oil are sold for $34.75, how many gallons may be bought for $150?

5. If I travel 45 miles every seven days, how far shall I get at the end of 43 days?

6. If I travel 24 miles every 2 days, how long before I shall have travelled 216 miles?

7. If 40 dozen of wine cost $360, what is the price of 5 dozen?

8. If 24 pieces of broadcloth cost $1776, what will 57 pieces of the same goods come to?

9. What is the price of 40 boxes of sugar, allowing $10 for every three boxes?

10. What is the cost of 14 bushels of wheat, if 450 bushels cost $470.90?

Remark. If one or the other, or all the terms of a sum in the Rule of Three, should contain fractions, then it is only necessary to reduce them all to mixed numbers, and to transpose the denominators from the second and third terms to the first term, and that of the first term to the second *term.* The product of all the numbers in the second and third terms, divided by the product of all the numbers in the first term, will then be the answer. To give an

Example. Suppose it were required to find the price of $4\frac{1}{2}$ yards of cloth, if $15\frac{2}{3}$ yards cost £$16\frac{3}{4}$. Then, stating our proportion according to the given rule, we should have,

$$\begin{array}{rcrcl}
\textit{yds.} & & \text{£.} & & \textit{yds.} \\
4\frac{1}{2} & : & 16\frac{3}{4} & :: & 15\frac{2}{3} \\
\frac{9}{2} & : & \frac{67}{4} & :: & \frac{47}{3} \\
9 & : & 67 & :: & 47 \\
4 & & 2 & & \\
3 & & \overline{} & & \\
 & & 134 & & \\
 & & 47 & & \\
 & & \overline{} & & \\
 & & 938 & & \\
 & & 536 & & \\
 & & \overline{} & & \\
\end{array}$$

$$\begin{array}{l}
108)6298(58\frac{34}{108} \text{ or } 58\frac{17}{54} \\
540 \\
\overline{} \\
898 \\
864 \\
\overline{} \\
34 \\
\overline{}
\end{array}$$

ANS. £$58\frac{17}{54}$.

The $4\frac{1}{2}$ yards of the first term, reduced to an improper fraction, give $\frac{9}{2}$; the £$16\frac{3}{4}$ give $\frac{67}{4}$, and $15\frac{2}{3}$ yards are equal to $\frac{47}{3}$ yards. When this is stated, the denominators 4 and 3, of the 2d and 3d terms, are transferred to the first term, whose denominator, 2, is put down in the second term. The numbers 67, 2 and 47, standing in the 2d and 3d terms, being then multiplied together, we obtain 6298 for their product, which, divided by 108, (which is the product of all the numbers standing in the first term,) give $58\frac{34}{108}$, or $58\frac{17}{54}$, for the answer.

This example will sufficiently show to the learner, that a sum in the Rule of Three containing fractions, may be solved with the same ease as one containing nothing but whole numbers.

Let the pupils now do the following sums:

1. What is the price of $4\frac{3}{4}$ yards of tape, if $\frac{3}{4}$ yards cost $\frac{4}{5}$ of a cent?

2. What is the price of $7\frac{4}{5}$ yards of cloth, if $\frac{1}{2}$ a yard cost $4\frac{1}{2}$ dollars?

3. What is the price of $3\frac{3}{4}$ dozen of wine, if $\frac{1}{2}$ a dozen cost $9\frac{1}{2}$ dollars?

4. What is the price of $443\frac{7}{8}$ barrels of beer, if $5\frac{3}{8}$ barrels *cost 17 dollars?*

5. What is the value of 147¾ feet of land, at $7.45 for every 3 feet?

6. 14 men can do a piece of work in 7½ days. How many men can do the same in 1 day?

7. 42 men have built a certain wall in 3½ days. How many men must be employed to build it in ½ a day?

8. 15 barrels of beer last a whole regiment 3½ days. How many barrels will last them a fortnight?

9. How many yards of silk ¾ of a yard wide will it take to line 15 yards of camlet ½ a yard wide?

10. How large must the principal be, which, at 5½ per cent, brings as much interest in a year as $5000 at 6½ per cent?

11. What must be the rate of interest in order that $1000 may gain $140 interest in a year?

12. How long before 500 men will finish a piece of work, if it could be done by half that number in 48 hours?

COMPOUND PROPORTION, OR RULE OF THREE.

Compound Proportion is when the answer does not only depend on three given things, as in the Simple Rule of Three, but on several other additional conditions, which are mutually depending upon one another.

Rule. State the three conditional terms of the question as in the Rule of Three, and endeavor to find out whether any two of the remaining terms, which are of the same denomination, increase or diminish the answer — that is, whether more requires more; or less, less. If the first, state the two terms in the same order, directly under the first two terms, as if they, together with the third term, would make a simple proportion, or rule of three; and so on. When all the terms are stated, then multiply all the second terms by the third, and divide the product by the product of all the first terms. The quotient will be the *answer sought.*

Example. $100 gain in 12 months $6. What will be the gain of $3400 in 18 months?

This sum could easily be done without a rule of three, as we have seen before in the exercises, page 121; but it may, nevertheless, serve here as a means of illustrating the rule just given.

$. $. $.
100 : 3400 : : 6 :
12 : 18
27200
34
61200
6
1200)3672.00($306
36
072
Ans. $306.

Or

$. $. $.
100 : 6 : : 3400 :
12 18
108
3400
43200
324
1200)3672.00($306
36
072
Ans. $306.

We state in the first place three of the given things in a simple proportion, or rule of three, viz: $100 are to $3400, as $6 (the interest on $100) are to the answer. Or, if $100 gain $6, what will be the gain of $3400? When this is done, there are yet the two terms 12 and 18 months remaining, which being of the same denomination, we ask the questions, whether more requires more and less less, or the reverse. This question is here answered in the affirmative, because more interest will be drawn in more time, and less interest in less time; so that if we had no other conditions given, we should say, 12 months are to 18 months as the interest of 12 months is to the answer, (the interest of 12 months.) We therefore place the 12 under the 100, and the 18 under the 3400, (or the 6,) and having multiplied the second and third terms, and divided by the product of the first terms, we obtain $306 for the answer.

Remark. We see here at once the reason why this rule is called *compound proportion*; for the answer sought, which in our example is the interest of $3400, is not only in proportion to the principal, but also in proportion to the time; and therefore in the compound proportion of the interest multiplied by the time.

Another Example. Ten men can build 25 rods of fence in 6 days. How many men will be required to build 30 rods in 3 days?

```
25 : 30 : : 10 :
 3 :  6
   ——
   180
    10
   ———
25)1800(24
   150
   ———
    300
    300
    ———
Ans. 24 men.
```

After stating the first three terms, 25 is to 30 as 10 to the answer, which are in direct proportion, because more requires more, (more men are required to build more fence,) we have the two terms 6 and 3 left, which are in *inverse* proportion to the answer; because the *more* men you have, the *less* time is needed, and the reverse. These two terms, therefore, are to be put down in a different order; instead of 6 to 3, as we should do if the proportion was direct, we say 3 to 6, which is called inversing the ratio. The rest of the sum is done as in the first example. Our answer, therefore, is 24 men.*

The same rule applies to three and more given conditions.

Let the pupils now do the following sums by themselves:

1. A trader, with a capital of $345.75, gained $75.00 in 3 months. How much would he gain at the same rate, with a capital of $1000, in 1 year, (12 months)?

2. A gentleman spends in 5 months $374.50. How long before 4 gentlemen will spend $1500 at the same rate?

3. If 40 barrels of beer last a company of 55 soldiers 18

---

* When the sum is once stated, a great deal of labor may be saved by dividing those numbers in the first and second terms, which have a common factor by their common divisors. Thus, the sum 25 : 30 : : 10 might have been changed into 5 : 6 : 10 : by dividing 25 and 30 by 5. We might now say, 5 into 10 twice, (1 : 2,) which would change our sum into 1 : 6 : : 2 : and multiplying the second and third terms together, we should at once have obtained *the answer, 24* men.

days, how long will 100 barrels last a company of 150 soldiers?

4. Five children inherited $1400, which they spent in 4 months. How long would it take three of them to spend $5000, at the same rate of expenditure?

5. Fifty men can dig a ditch 100 yards long and 4 wide, in 30 days. How many men must be employed to dig a ditch 400 yards long and 5 wide in 5 days?

6. If the crew of a vessel consisting of 16 men need 1 hogshead of water for 1 month, (30 days,) how long can the crew of a larger craft, consisting of 24 men, subsist on 40 hogsheads?

7. If 10 acres feed 15 oxen for 20 days, how many acres would feed 400 oxen for 90 days?

8. 100 men can build a wall 300 feet long, 2 feet deep and 6 feet high, in 10 days. In how many days can 50 men build 50 feet of wall, 3 feet deep and 4 feet high?

Remark. This question, although apparently somewhat complicate, is not more difficult than the others, and may be stated thus:

300 : 50 : : 10 :
2 : 3
6 : 4
50 : 100

All the terms are in direct proportion to the answer, because more requires more, viz: the longer the wall the more time is required; the deeper the wall the more time, and the higher the wall the more time; but the last proportion is inverse, because more men require less time. This proportion, therefore, is the only one which must be stated inversely.

9. If 40 men can dig a trench 40 yards long, 3 deep, and 8 yards wide, in 8 days, how many men would be employed to finish a trench 100 yards long, 12 wide and 3 deep, in 24 hours (1 day)?

10. 5 boxes of sugar last a family, consisting of 10 persons, 6 months. How long will 15 boxes last a family of 8 persons?

11. What principal will in 3 years gain as much interest at 5 per cent, as $4000 gain in 2 years, at 6 per cent?

12. If $4000 have gained $175.85 in 15 days, what would be the gain of $1575.84 at the same rate in 30 days?

13. If $2435.28 have gained $138.75 in 2 months, in how many days would $10000 gain $500, at the same rate of interest?

14. A trader gains, with his capital of $1200, annually, $120. What capital is required to gain $5 a day, at the same rate of interest?

15. At what rate of interest must $5000 be put out, to gain semi-annually $400?

Remark. This question is the same as this: $5000 gain in 6 months $400; what will $100 gain at the same rate of interest in 12 months? because when the rate of interest is required, it is always the same as though we wished to know what $100 will gain in 1 year. (See definition of interest, page 114.)

16. What must be the rate of interest in order that $12500 shall gain $3 a day?

17. What must be the rate of interest in order that $4500 shall gain $1 a day?

18. In how many days will $4734.85 gain $137.54, at the rate of 6 per cent per annum?

19. In how many days will $10000 gain $50, at the rate of 5 per cent per annum?

20. What must be the capital which in 24 days gains $145.75, at the rate of 4 per cent per annum?

21. What must be the capital which in 30 days gains $150, at the rate of 6 per cent per annum?

22. What must be the capital which in 10 days gains $25.00?

23. What, that which in 8 days gains $450?

24. What, that which in 40 days gains $1000?

Remark. If three, or all the terms of a compound proportion, or rule of three, should contain fractions, or mixed numbers, then reduce the mixed numbers all to improper fractions, and transpose the denominators of the second and third terms to the first terms, and the denominators of the first terms to the second; after which, multiply in the usual way all the numbers standing in the second and third terms, and divide by the product of all the numbers standing in the first terms. The quotient will be the answer in whole numbers.

Examples. $14\frac{3}{4}$ rods of wall, $2\frac{1}{2}$ feet deep, can be built by a certain number of men in $25\frac{1}{2}$ days. How long before the same number of men will build $34\frac{4}{5}$ rods of wall $3\frac{1}{8}$ feet deep?

STATEMENT.

$$14\tfrac{3}{4} : 34\tfrac{4}{5} :: 25\tfrac{1}{2} :$$
$$2\tfrac{1}{2} : \ 3\tfrac{1}{8}$$

Or, reducing the mixed numbers to improper fractions,

$$\tfrac{59}{4} : \tfrac{174}{5} :: \tfrac{51}{2} :$$
$$\tfrac{5}{2} \quad \tfrac{25}{8}$$

OPERATION.

By transposing the denominators, we obtain

```
59 : 174 : : 51
 5     4     2
 8   ———   ———
 2   696   102
           696
          ————
           612
          918
         612
         ————
4720)70992(Ans. 15 192/4720
     4720            [days.
     —————
     23792
     23600
     —————
       192
```

Let the pupils now do the following sums, for the sake of practice:

1. £$145\frac{3}{4}$ gained in $3\frac{1}{2}$ months £$45\frac{3}{8}$ interest. What will be the gain of £$345\frac{1}{2}$ for $5\frac{1}{2}$ months, at the same rate of interest?

2. What must be the rate of interest in order that £$478\frac{3}{4}$ shall gain in $1\frac{1}{2}$ months £45 $14\frac{1}{2}$ shillings?

[This question is the same as this: What must be the gain of £100 per annum in order that £$478\frac{3}{4}$ shall gain *£45 $14\frac{1}{2}$ shillings* in $1\frac{1}{2}$ months? The pounds must either be reduced to shillings, or the shillings reduced to a fraction of a pound.]

3. In what time will £457¾ gain £75½, at the rate of 5½ per cent?

[This question is the same as this: If £100 gain £5½ in 1 year, in what time will £457¾ gain £75½, at the same rate of interest?]

4. What must be the rate of interest in order that £478½ may gain as much at the rate of 5¾ per cent, as £4000 at the rate of 4½ per cent in 7½ months?

5. What must be the rate of interest in order that £471½ may gain £47¾ in 3 months?

6. What must be the rate of interest in order that $4569¾ may gain in 1 year as much interest as $4759, at the rate of 5½ per cent, in 3½ months?

TARE AND TRETT.

Tare and Trett are the allowances which are made in selling goods by weight. By *tare* is meant the allowance made by the seller of the goods to the buyer, for the weight of the box, barrel, hogshead or bag which contains the commodity.

Gross weight is the whole weight of the goods before any allowances are made; and *net weight* is that which remains after all the allowances are deducted.

All sums in tare and trett may be done by a simple multiplication and subtraction, or in some cases also by a simple rule of three, as may be seen from the following

Example. What is the net weight of 54 boxes of sugar, weighing gross 42800 lbs., allowing tare 25 lbs. on each box?

54	
25	
270	42800
108	1350
1350 lbs. the amount of tare	41450 lbs. the net weight of the sugar.

If it be required to find the price of the goods at so much a barrel, hogshead, yard, &c, then, after deducting the tare and trett, find the cost of the net weight, which will be your answer.

Example. At 20 cents per pound, what is the price of 50 casks of allum, weighing gross 67 cwt. 3 qrs. 14 lbs., allowing 18 lbs. per cask tare?

Multiply 50
by 18
900 lbs.=the tare.

Reduce 67 cwt. 3 qrs. 14 lbs. to pounds.
67
4
271
28
2168
542
14
7602=gross wt.
Deduct 900
6702=net wt.
Multiply by 20
$1340.40=Answer.

Let the pupils now do the following sums:

1. At $11.75 per cwt. what will 14 hhds. of tobacco come to, weighing gross 11 cwt. 27 lbs. per hogshead, allowing tare 14 lbs. per cwt?

2. At $10.50, what will 6 hhds. of tobacco come to, weighing gross, viz:

	cwt.	*qrs.*	*lbs.*
No. 1,	10	3	17
No. 2,	11	2	14
No. 3,	9	1	15
No. 4,	8	0	16
No. 5,	7	1	21
No. 6,	11	2	14,

Tare being 14 lbs. on each hundred weight, and in proportion for the rest, (that is, for every 112 lbs. there is to be made an allowance of 14 lbs.)?

3. At $63.50 per hhd. what will 5 hhds. of sugar come to, weighing gross, viz:

	cwt.	*qrs.*	*lbs.*
No. 1,	6	3	14
No. 2,	7	1	14
No. 3,	3	2	20
No. 4,	4	0	25
No. 5,	8	0	9,

Allowing 12 lbs. per cwt. (12 lbs. out of 112)?

4. At 13 cents a pound, what is the price of 4 bags of coffee, weighing as follows:

No. 1,	128 lbs.
No. 2,	134 lbs.
No. 3,	200 lbs.
No. 4,	186 lbs.

Allowing 2 lbs. on 100 lbs. tare and trett?

5. At 6 cents per pound, what is the cost of 3 hhds. of sugar, weighing gross, viz:

	cwt.	*lbs.*
No. 1,	1	14
No. 2,	2	17
No. 3,	1	24,

Allowing tare 9 lbs. out of 100 lbs.?

6. At $54.75 per cwt. what will 5 boxes of sugar come to, weighing, gross,

	cwt.	*qrs.*	*lbs.*
No. 1,	2	1	14
No. 2,	3	2	12
No. 3,	1	1	13
No. 4,	2	1	14
No. 5,	3	1	20,

Allowing 20 lbs. per barrel? Deduct the tare and trett om the gross weight, and find the price by a simple rule of three; saying, If 112 lbs. cost $14.75, what will the *number of* lbs. net weight come to?

DISCOUNT.

Discount is the allowance of a certain sum of money for a payment made before it is due. It is common to average it in per cents, and it is calculated two different ways.

I. By finding the interest of the money for the time until it is due, and deducting it from the whole amount. This is the way in which discount is calculated in most countries, and which is also customary with most of the *banks* in the United States.

II. By finding at once the principal, which, together with the interest for the time until it is due, amounts to as much as the whole sum which is due. This principal, deducted from the sum which is due, is the discount.

We shall now illustrate both ways by an

Example. Suppose the question was asked, what sum of money must be paid for $500, payable in 6 months hence, allowing 6 per cent discount? Or, in other words, what is the present value of $500, due in 6 months?

I. By the first method, we should only have to find the interest of $500 at 6 per cent for 6 months, which would be the discount; and deducting it from $500, we should obtain the sum of money which, paid at the present moment, would discharge a debt of $500, payable in 6 months. Thus,

$$\begin{array}{r} 500 \\ 3 \\ \hline \$15.00 \end{array}$$

$15.00 = the discount, (because 6 per cent per annum is the same as 3 per cent for 6 months.

$$\begin{array}{rr} \text{And} & 500 \\ \text{less} & 15 \\ \hline & \end{array}$$

$485 is the amount that must now be paid.

II. By the second method, we should ask what would be the gain of $100 in 6 months, at the rate of 6 per cent? This being easily found to be $3, we should find the rest by a simple rule of three.

$$103 : 100 :: 500 :$$

that is, $100, *with the interest for the given time, are to* $100, *as the given sum is to the answer;* because the meaning of this statement is this: The amount of $100, with the interest for the given time, is to $100, as the sum due (which is considered as the amount of principal and interest) is to the answer, which must be the principal which in the given time amounts to the sum due.

103 : 100 : : 500 :
500

103)50000(485.43.7
412
880
824
560
515
450
412
380
309
710

Answer $485, 43 cents, 7 mills.

$500.000
485.437

And the discount would be $14.56.3

We perceive that the answers obtained by the two methods we have just explained, are *not* the same; but that the bank discount amounts to more than that calculated by the second method: and this difference will be the greater, the greater the sum is of which discount is to be taken, and the time before it is due. The second method is the most mathematical, but the first is generally used.

To distinguish between the two, we shall call the first method *bank discount*, because banks are in a habit of calculating discount in this manner.

Let the pupils now do the following sums:

1. What is the present value of $300, due in 3 months, *reckoning* discount at 6 per cent? What, therefore, is the *discount?*

2. What is the present value of $800, due in 8 months, reckoning bank discount at the rate of 6 per cent. What does the discount amount to?

3. What is the discount on $345, at 6 per cent, for 3 months?

4. What is the bank discount of the same amount for 3 months?

5. What is the present worth of $575.75, payable in 6 months, reckoning discount at the rate of 6 per cent per annum?

6. What is the bank discount of $575.75, payable in 6 months hence, at the rate of 6 per cent?

7. What is the present worth of $25, payable in 3 months, reckoning discount at 5 per cent?

8. What is the present worth of $125, payable in 30 days, reckoning discount at the rate of 10 per cent?

9. What is the present worth of $125, payable in 30 days, reckoning bank discount at the rate of 10 per cent?

10. What is the present value of a note of $350, payable in 9 months, reckoning discount at the rate of 4 per cent per annum?

11. What is the present value of a note of $350, payable in 9 months, reckoning bank discount at the rate of 10 per cent per annum?

What are the present values of

12.	$150.00,	payable in	10	months,	discount	6 per cent?
13.	$134.75,	"	8	"	"	5 per cent?
14.	$247.50,	"	9	"	"	4 per cent?
15.	$439.75,	"	7	"	"	3 per cent?
16.	$199.87½,	"	6	"	"	5½ pr cent?
17.	$1000,	"	5	"	"	6½ pr cent?
18.	$345,	"	3½	"	*bank* disc.	6 per cent?
19.	$175,	"	2½	"	"	5 per cent?
20.	$3000,	"	5½	"	"	4½ pr cent?
21.	$1758.50	"	6½	"	"	5¾ pr cent?

What are the present values of

22. $580.00, payable in 35 days, bank discount 6 per cent?
23. $348.75, " 45 " " " 7 per cent?
24. $189.50, " 60 " " " 8 per cent?
25. $388.78, " 75 " " " 9 per cent?

26. A note of $500, dated March 26th, and payable 6 months after date, is to be discounted at a bank on the 30th of July, at the rate of 6 per cent per annum. What is the worth of this note on that day?

[*Remark.* Find when the note becomes due, in order to know how many days it has yet to run. This being done, take the interest at 6 per cent on $500, for the number of days between the 30th of July and the time the note comes due, and deduct it from $500. The remainder will be the answer sought.]

27. A note of $475.50, dated June 8th, and payable in 8 months from date, is to be discounted on the 10th day of October, bank discount being reckoned at the rate of 8 per cent. What must be considered the value of this note on that day?

28. A note of $125, dated July 1st, and payable in 4 months after date, is to be discounted on the 4th day of August, interest or bank discount being reckoned at the rate of 6 per cent. What must be considered the value of the note on that day?

29. What is the bank discount at 6 per cent on a note of $478.50, payable in 6 months?

30. What is the bank discount at 6 per cent on a note of $500, dated July 4th, payable in 6 months, if this note be negotiated on the 8th of August, of the same par?

31. What is the bank discount at 5 per cent on a note of $178.45, dated January 8th and payable in 9 months, if this note be negotiated on the 16th of July?

32. What is the whole amount which I am to receive on *the 10th of* September for a note of $450, dated August 4th, *payable in 6* months, allowing 10 per cent bank discount?

LOSS AND GAIN.

This is a rule by which is ascertained how much a merchant has lost or gained by the sale of certain goods, or by how much he must raise or lower the price of a certain commodity, to insure a certain number of per cents profit or loss. These sums require but a combination of the preceding rules, as may be seen from the following examples:

I. Bought 450 lbs. of coffee, at $13\frac{1}{2}$ cents per pound, and sold it again at 15 cents per lb. What is the profit on the whole?

450 lbs.
multiplied by $13\frac{1}{2}$ cents,

1350
450
225

give $60.75 for the cost of the [commodity.
And 450 lbs.
multiplied by 15

2250
450

give $67.50 for the amount of [the sale.

And deducting from the am't of sale, $67.50
the first cost of 60.75

you obtain the net profit $6.75 which is the answer sought.

II. Bought 350 yards of broadcloths, at $3.75 per yard. What must I sell the whole for, to gain 15 per cent in the bargain?

Multiply 350 yards
by 375

1750
245
105

$1312.50 = the cost.

Now if I wish to gain 15 per cent in the bargain, I must sell the lot at 15 per cent advance. Taking, therefore,
15 per cent on $1312.50
15

656250
131250

we obtain $196.8750 ; and adding to this
the original cost $1312.50

we obtain $1509.37.5 for the answer.

Let the pupils now do the following sums for practice:

1. Bought 50 bushels of potatoes at 50 cents a bushel, and sold them again at 62½ cents per bushel. How much did I gain in the bargain?

2. Bought 450 barrels of flour at $4.55 per barrel, and shipped them to South-America, where they were sold for $6.25 a barrel; paid freight and insurance $21.40. What is my net profit?

3. Bought 120 hhds. of wine at $35 a hogshead, and sold them again at the rate of $40 a hogshead, but deducted 3 per cent for prompt payment. What is my net profit?

[*Remark.* Find the cost of 120 hogsheads, and also the amount of the sale; from which deduct 3 per cent, and from the remainder again the original cost. This last remainder will be the answer sought.]

4. Bought 140 acres of land at $3.75 an acre, and sold them again at $5 an acre; allowed 5 per cent for prompt payment. What is my net profit in the bargain?

5. What must I sell 40 bags of coffee for, each weighing 130 lbs., and standing me in 12 cents a pound, in order to gain 12½ per cent in the bargain?

6. What must I sell 50 bags of coffee per pound, in *order to have* 15 per cent net profit, if they stand me in for *$728, and* weighing 5600 lbs.?

7. Bought 15 hhds. of wine, for $460, and sold them again for $500. What did I gain per cent?

[*Remark.* This question is solved by a simple rule of three, and is the same as if the question had been asked: If $460.00 gain $40 what will $100 gain? because selling the wine for $500 is yielding me a profit of $40. The question may, therefore, be stated in this manner:]

$$
\begin{array}{l}
460 : 40 :: 100 \\
40 \\
\hline
46|0)400|0(\text{Ans. } 8\tfrac{32}{46}, \text{ or } 8\tfrac{16}{23} \text{ per cent.} \\
368 \\
\hline
32
\end{array}
$$

8. Bought 4 hhds. of sugar, each weighing 250 lbs., for $70.00, and sold them again at 8 cents per pound. How much did I gain per cent?

[*Remark.* Find first the net profit on the whole, from which you may find the gained per cent, by a simple rule of three, as in the preceding example.]

9. Bought 350 gallons of wine at $1 per gallon, and sold them again at $1.25 per gallon; but deducted 3 per cent for cash. What is my net profit?

10. Bought 400 barrels of flour, at $4.50 per barrel, which I paid for by a note of 6 months, and sold them again on the same day for $5.00 per barrel, giving a credit of 12 months. What was my gain or loss in the bargain, reckoning bank discount at 6 per cent?

[*Remark.* Find first the cost of the 400 barrels, at $4.50 per barrel, from which deduct 3 per cent: this will be equal to the cash price of the cost. Find, also, the amount of 400 barrels at $5.00 per barrel, from which deduct 6 per cent; this will be the cash price of the sale: and the difference between the cash price and the cash cost, is the real gain or loss in the bargain.]

11. Bought 14 bags of coffee, each weighing 135 lbs., and paid cash for them at the rate of 10 cents per lb., but sold them again at the rate of 11½ cents per lb., giving a

months credit. What is the net profit, allowing discount at the rate of 5 per cent?

12. Bought 40 barrels of beer at $3.00 per barrel, and paid for them by a note of 6 months, but sold them again for $3.50 a barrel, allowing 4 months credit. What is my net gain in the bargain, reckoning bank discount at the rate of 6 per cent?

13. Bought 500 barrels of oil at $30 a barrel, giving my note for the amount, payable in 6 months. One month later I sold them for cash, at the same price. What is my gain in the bargain, reckoning bank discount at the rate of 5 per cent?

[Find the price of 500 bls. at $30 a barrel, from which deduct 3 per cent interest; this will be the *cash cost* of the oil. Again, from the price of 500 barrels at $30 a barrel, deduct ½ per cent for keeping them one month in the store; this will be the cash price of the sale: and the cash cost, deducted from the cash price of the sale, will be the net profit.]

14. Bought 4 hogsheads of tobacco, weighing 30 cwt. 2 qrs., at $8 per cwt., for which amount I gave my note, payable in 6 months. One month later I sold the same commodity at the same price, allowing 60 days' (2 months) credit. What is my net gain, allowing 6 por cent bank discount on both notes?

15. Bought 130 bushels of corn at $0.75 cash per bushel, and sold them again 3 months later, at $1.00 cash per bushel. What is my net gain, allowing interest at the rate of 6 per cent?

16. Bought 400 bushels of corn at $0.75 cash, but sold them again 3 months later, at the rate of $1.00 per bushel, allowing 3 months credit. What is my net gain in the bargain, allowing interest at the rate of 6 per cent?

[*Remark.* In this case 6 months interest must be deducted from the price they sold for; because, in addition to the credit of 3 months, the goods have already been 3 months on hand.]

17. Bought 40 chests of tea at $95.50 per chest, which I wish to sell at 20 per cent profit. What must I sell a chest for?

[*Remark.* Find the price of 40 chests, to which add 20 per cent, and divide the sum by 40.]

18. What must I sell 20 pipes of wine for, which stand me in at $60 a pipe, in order that I may gain 15 per cent in the bargain?

19. What must I sell 40 bags of cotton for, that stand me in at $10 a bag, in order to gain 25 per cent in the bargain?

20. Bought a certain commodity, for which I paid cash $350; I now wish to sell it again at a profit of 10 per cent, but am obliged to give 3 months credit. What must I sell it for, in order that I may have the desired profit, reckoning bank discount 6 per cent per annum?

[*Remark.* The commodity costs - - - $350 cash.
10 per cent on $350 - - - - - - - - - 35 profit.

I ought, therefore, to sell it for - - - - $385 cash,

but being obliged to give 3 months credit, I must alter my price so as to obtain $385, after 3 months discount at 6 per cent are deducted from it. But $100 give in 3 months $1.50, at the rate of 6 per cent per annum. I have, therefore, the proportion,

```
100 : 101.50 : : 385 :
             385
           -----
           50750
          8120
         3045
         -------
         390.77.50.
```

Ans. $390 77½ cents, which may be proved by finding the present value of $390.77½, payable in 3 months.

If bank discount was calculated, then we should have the proportion, 98.50 : 100 : : 385 :

100

98.5|0)38500.0|0($390.86½ cents, nearly.

2955

8950

8865

8500

7880

6200

5910

290. Ans. $390.86½,

because in bank discount we deduct 1½ per cent for 3 months, (which is equal to 6 per cent per annum) from 100, and say, If $98½ *are paid for* with $100, what sum will pay for $385?

In a similar manner are the four next sums solved.

21. Bought a certain commodity for $500 cash, which I wish to dispose of at a net profit of 25 per cent, but am obliged to give 6 months credit. What must I make the price of this commodity to have the desired profit, after the discount at 6 per cent for 6 months?

[Find both answers for the common discount, and for bank discount.]

22. Bought a certain commodity, for which I paid $1250.30 cash. Wishing to sell it again, at a net profit of 10 per cent, I am obliged to give 9 months credit. What must I make the price of the commodity, calculating bank discount at the rate of 5 per cent?

23. Bought 120 yards of cloth, for which I paid cash $4.75 a yard. Wishing to sell them again so as to gain 20 per cent in the bargain, I am willing to give 1 year's credit. What must I put the price per yard, so as to obtain the desired profit?

[*Find what* he must sell the whole for, and divide the *answer by 120,* which will be the price per yard.]

24. Bought 5000 yards of cotton, for which I paid 10½ cents per yard; but finding that the quality is not as good as I expected, I am willing to sell them again at cost. Now, as I am obliged to give 6 months credit, what must I put the price per yard, reckoning bank discount at the rate of 6 per cent per annum?

[Find the price of the whole lot, and divide it by 5000.]

25. Bought 450 yards of French gros de Naples, which I paid for at 50 cents a yard, by a note of 3 months; but the quality being not so good as I expected, I am willing to sell it again at a net loss of 5 per cent. Now as I am obliged to give 9 months credit, what must I put the price per yard, reckoning 6 per cent bank discount?

[*Remark.* Deduct from the cost of 450 yards, at ½ dollar a yard, 1½ per cent bank discount; this will be the cash cost of the goods. Deducting further 5 per cent, you will get the cash price I am to sell it for; but this being once found, you can easily find the price for 9 months credit, as in example 20; which, divided by 450, gives you the price per yard.]

26. Bought 400 barrels of flour at $5.00 a barrel, payable in 6 months. What must I sell them for per barrel, in order to gain 10 per cent and give 9 months credit, reckoning bank discount at the rate of 6 per cent per annum?

[*Remark.* Find the cash cost of 400 barrels, to which add 10 per cent, to gain the cash price I must sell them for, from which the rest is easily found.]

27. Bought 1960 yards of broadcloth, at the rate of $3.25 per yard, payable in 6 months. What must I sell it per yard to make 15 per cent profit, allowing 12 months credit, and reckoning bank discount at the rate of 6 per cent per annum?

28. Bought 1200 lbs. of coffee at 11½ cents per pound, for which I gave my note payable in 3 months. What must I sell them for to gain 15 per cent, by giving 9 months credit, reckoning bank discount at the rate of 6 per cent per annum?

29. Bought 40 boxes of sugar at $30.75 per box, giving my note for the amount payable in 3 months, and sold them again at $35.25 a box, allowing a credit of 6 months; What is my net profit, reckoning discount at the rate of 6 per cent per annum?

30. Bought 3000 barrels of pork at $25 a barrel, for the amount of which I gave my note, payable in 6 months; but sold them again at $28 per bl. cash. What is my net profit?

31. Bought 40 chests of hyson tea at $50 a chest, for which I gave my note payable in 6 months, but sold them again at $52 a chest, payable in 30 days, (1 month.) What is the amount of my profit, reckoning bank discount at the rate of 6 per cent per annum?

[*Remark.* Find the cash cost of the 40 chests of tea, by deducting 3 per cent from the cost of 40 chests, at $50 a chest. Find also the cash price of the sales, by deducting ½ per cent (1 month's interest) from the price of 40 chests at $52 a chest. The difference, between the cash cost and the cash price of the sale, is the clear profit.]

32. Bought 45 hhds. of molasses at $35 per hogshead, for which I paid by a note payable in 3 months: 2 months later I sold them again at the rate of $40 a hogshead, payable in 6 months. What is my clear profit, reckoning bank discount at the rate of 6 per cent per annum?

[*Remark.* 4 per cent are in this sum to be deducted from the price of the sale; because the goods were 2 months on hand, and are not paid for until 6 months hence, making in the whole 8 months interest at 6 per cent per annum, which for 8 months is equal to 4 per cent.]

33. Bought 150 barrels of cider at $2.75 a barrel, for which I paid by a note payable in 6 months: 1 month later I had occasion to sell them again at $3.00 a barrel, allowing but 3 months credit. What is my net profit, reckoning bank discount at the rate of 6 per cent per annum?

34. Bought 200 barrels of beer at $3.00 a barrel, for which I paid by a note of 6 months: 2 months later I sold

the same at $3.50 a barrel, allowing 9 months credit. What is my net profit, reckoning bank discount at the rate of 6 per cent per annum?

35. Bought 540 gallons of wine, for which I paid $2.50 per gallon, by a note payable in 3 months. Four months later I sold the same at the rate of $2.62½ a gallon, allowing 1 year's credit. Did I gain or lose in the bargain, reckoning bank discount at the rate of 6 per cent per annum? And how much?

EQUATION OF PAYMENTS.

This is a rule by which we find the mean time of payment of several sums of money due at different times.

Rule. Multiply each sum of money by the time in which it becomes due; make the sum of these products, and divide it by the whole amount due. The quotient is the mean time of payment.

Example. Supposing a person owes me, for goods purchased at different times at my store, $100 due in 30 days, $200 due in 25 days, and $150 which will become due in 10 days: he wishes to settle all at once. What is the mean time of payment; or, in other words, how long is he to keep the money if he wishes to pay his whole debt at once?

Then	$100	$200	$150
	30	25	10
	3000	5000	1500, are the different products.

Which added together, { 3000
5000
1500 }

and divided by the whole sum due, viz. } 450)9500(gives 21 days nearly; which,
900 therefore, is the answer.
500
450

Let the pupils now do the following sums:

1. A owes B three different sums of money — $150 due in 3 months, $240 in 60 days, and $300 in 4 months. What is the mean time of payment?

2. A owes B $500 due in 3 months, $350 in 2 months, and $200 in 1 month. What is the mean time of payment?

3. A owes B four different sums of money, viz: $1000 due in 3 months, $500 in 6 months, $400 in 5 months, and $300 due in 2 months. He wishes to discharge these four debts at once. What is the mean time of payment?

4. A owes B $500, which by agreement are due as follows: $100 in 1 month, $200 in 60 days, and the remaining $300 in 3 months. He wishes to discharge the whole debt at once. What is the mean time of payment?

5. A owes B $400, which by agreement are to be paid in 4 equal instalments, viz: the first instalment of $100 in 30 days; the second, 30 days after the first instalment; the third, 30 days after that, and so on. He wishes to discharge the whole debt at once. What is the mean time of payment?

[*Remark.* Since the debt was to be discharged in four equal instalments of $100 each, payable in 30 days one after another, it is necessary to multiply 100 by 30, by 60, by 90 and by 120. The sum of these products, divided by 400, is the mean time of payment.]

6. A owes B $600, which are to be paid in three equal instalments of $200 each. The first of these instalments it is agreed is to be paid in 60 days; the second, 60 days after the first; and the third, 60 days after the second. He wishes to pay the whole at once. What is the mean time of payment?

7. A owes B $500, which are to be paid in two equal instalments, of which the first is due in 2 months, and the second in 3 months after that. Now he wishes to pay the whole debt at once. What is the mean time of payment?

8. A owes B $400, for which he has given him two *notes — one of* $150, which is due in 45 days, and another

of $250, which is due 90 days after that. He wishes to settle the whole at once. What is the mean time of payment?

9. A owes B $1000, which are due in four different instalments — $150 in 30 days, $250 in 60 days after that, $350 in 90 days after that, and the remainder in 6 months after the third instalment. Now if the whole is to be settled at once, when does it become due?

10. Bought a certain commodity, for which I gave my notes — one of $300 payable in 3 months, and another of $350 payable in 6 months. One month after the purchase, I wish to give a note for the whole amount. How many days must the note be written?

[*Remark.* The first note will have to run 2 months longer, and the second, 5 months. You must, therefore, multiply $350 by 60, (days,) and $350 by 150. The rest of the solution is as in the preceding examples.]

11. Bought a certain commodity for $500, for which I gave two notes, one of $300 payable in 60 days, and one of $200 payable in 6 months. 30 days after the purchase I wish to give my note for the whole amount. What is the mean time of payment?

12. Bought a certain quantity of goods, for which I gave my notes, viz: one of $150 payable in 30 days, one of $450 payable in 3 months, and one of $350 payable in 6 months. A fortnight after the purchase, I wish to give my note for the whole amount. How many days after date must the note be written?

INTEREST ON NOTES.

Rule. In computing interest on notes, on which there are several endorsements,* it is customary first to find the amount of the note, calculating interest for the whole time; and then deduct from the amount, each separate payment or endorsement, together with the interest on it to the time the settlement is made.

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* When a payment is made on account of a note, it is generally *marked on the back*, and is then called an endorsement.

Example. A had given B his note for $500, dated January 1st, and payable on demand with interest at 6 per cent. Upon this note there are the following endorsements:

March 1st,	$100
March 15th,	50
April 5th,	150
June 1st,	200,

Settlement is made on the first of October. What sum is due from B to A upon that note?

The principal due by note, - - -		$500.00
Int. on the same, from Jan. 1st to Oct. 1st, (9 mon.)		22.50
Whole amount due		$522.50
From this must be deducted,		
1st payment of - - - - -	$100.00	
Interest on $100, from 1st of March to Oct. 1st, (7 months) - - - -	3.50	
2d payment of - - - - -	50.00	
Interest on $50, from March 15th, to October 1st, (6½ months) - -	1.62½	
3d payment of - - - -	150.00	
Interest on $150, from 5th of April to Oct. 1st, (5 months and 25 days)	4.37½*	
4th payment of - - - -	$200.00	
Interest on $200, from June 1st to Oct. 1st, (4 months) - - -	4.00	
	$513.50	$513.50
Balance due		$9.00

Let the pupils now do the following sums:

1. A purchased of B a certain commodity, and gave him in payment a note of $1200, dated March 1st, payable on demand with interest. Upon this note there are the following endorsements or payments, on account:

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* In interest accounts, the month is generally estimated 30 days, and the year 360 days.

April 15th,	$150
May 10th,	100
June 25th,	200
August 30th,	300.

Settlement is made on the 10th of September. What is the whole amount due, interest being calculated at 6 per cent?

2. A, for value received, gave B his note of $1000, dated February 5th, and payable on demand with 6 per cent interest. Upon the back of this note are the following endorsements:

April 1st,	$250
May 15th,	150
June 5th,	300
August 8th,	50.

Settlement is made on the 10th of October. What is the whole amount due?

3. For value received, A promises to pay to B the sum of $800 on demand, with interest at the rate of 5 per cent. The note is dated February 3d, and on its back are the following endorsements:

March 2d,	$85.75
April 3d,	79.50
June 17th,	50.00
August 18th,	60.00
September 30th,	400.00.

Settlement is made on the 15th of November. What is the amount due?

4. For value received, A gave B his note of $778.50, dated 3d of July, and bearing interest at 6 per cent after 60 days.[*] Upon this note there are the following endorsements:

3d of August,	$100.00[†]
5th of September,	87.45
8th of October,	450.75
10th of November,	33.62.

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[*] By this is meant, that no interest is to be reckoned from the 3d of July till the 3d of September, but for all the time after the 3d of September.

[†] The interest on each endorsement is to be reckoned from the day *the payment* is made.

Settlement is made on the 1st of December. What is the whole amount due?

5. A has given B his note of $480.33, dated February 1st, and payable on demand, with interest at 6 per cent after 30 days. Upon the back of this note are the following endorsements:

March 15th,	$175.00
April 4th,	38.75
May 30th,	85.50
August 1st,	50.00.

Settlement is made on the 1st of September. What is the whole amount due?

6. A owes B $400, for which he gave him his note, dated January 8th, bearing 6 per cent interest. On the back of this note are the following endorsements:

March 1st,	$150.00
April 4th,	$100.00
May 10th,	45.50
June 3d,	40.75,

Settlement is made on the 1st of October. What is the amount still due?

FELLOWSHIP

Is a rule which teaches to divide the gain or loss of two or more persons who trade with a joint stock. It is either Simple or Compound. Simple Fellowship is when different stocks are employed for the same time; and Compound Fellowship is when different stocks are employed for different times.

a. Simple Fellowship.

Rule. As the whole stock is to the whole gain, so is each man's stock to each man's gain.

Example. A and B bought together a certain quantity of goods, towards which A pays $100 and B $150. They *sold at a profit* of $50. How are they to divide the gain?

$100

150

250 : 50 : : 100 :

100

250)5000(20

500

00

A's share is $20.

$100

150

250 : 50 : : 150 :

50

250)7500(30

750

00

B's share is $30.

Let the pupils do the following sums:

1. A, B and C formed a joint stock, towards which A furnishes $450, B $350, and C $250. After trading for some time, they find that they have gained $400. What is each man's share?

2. A, B and C jointly chartered a vessel. A put on board $3700 worth of goods, B put on board the value of $2700, and C the value of $1100; insurance was procured for $6000. Now the vessel being lost at sea, how are A, B and C to divide the $6000?

[*Remark.* We have again the proportion: As the amount of the whole charter is to the value each man put on board, so is the whole insurance to each man's recovery.]

3. A, B and C jointly bought a house. A paid ½ of the price, B ⅓, and C the remaining ⅙. They subsequently agree to sell it, by which they gained $600. What is each one's share of the gain?

4. A, B, C and D formed a joint stock. A contributes $1500, B $3500, C $4000, and D $4500. When they dissolved partnership, they found they had gained $5000. What is the share of each?

5. A, B, C and D formed a joint stock, towards which A contributed $1200, B $1500, C $1500, and D $1000. When they settled their account, they found that they had lost $250 in the concern. What is the proportional loss of each partner?

6. A merchant, engaged in an unhappy business, fails, and leaves his estate, worth $12000, to be divided among his four creditors, A, B, C and D, in proportion to their demands. Now A's claim is $4800, B's $9600, C's $4000, and D's $2000. How much is each of the four creditors to receive out of the estate?

[As the sum of all the claims is to each creditor's claim, so is the whole estate to each one's share.]

7. A, B and C trade in company; A puts in $4533, B $1744, and C $3840. After a certain time they find they have gained $1000. What is the share of each?

8. A, B and C trade together; A contributes $500, B $350, and C $475. After some time they find they have lost $120. What is the loss of each?

9. A person indebted to A, B and C, signs his estate, worth $5000, over to his creditors. A's demand is $2500, B's is $4500, and C's is $1000. How must these three creditors divide the estate?

10. A, B and C jointly chartered a vessel. A contributes goods to the amount of $3500, B to the amount of $4500, and C the amount of $1500; they procured insurance for $8000. The vessel being lost at sea, how much does each of the partners recover?

11. A, B and C jointly chartered a vessel. A contributes $1500, B $3500, and C $4000. During a gale part of their goods were injured, damages being averaged at $5000. What is each partner's share in the loss?

12. A, B, C, D and E jointly commence business. A contributes $3000, B $3500, C $4000, D $4500, and E $5000. After some time they find their net profit to amount to $6000. What is the share of each?

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b. Compound Fellowship

Is when the different contributions are made at different *times.*

Rule. Multiply each man's stock by its time; then, as the sum of their products is to the whole gain, so is each separate product to its gain.

Example. A, B and C trade in company: A put in $100 for 4 months, B put in $250 for 2 months, and C $300 for 5 months; they gained $300. What is each one's share of the gain?

100 250 300
4 2 5
——— ——— ———
400 500 1500; consequently, according to rule,

400
500
1500
———
2400 : 300 : : 400 : A's gain. Ans. $50.00.
2400 : 300 : : 500 : B's gain. Ans. $62.50.
2400 : 300 : : 1500 : C's gain. Ans. $187.50.

Let the pupils now do the following sums:

1. A, B and C trade in company: A puts in $1000 for 3 months, B $1200 for 2 months, and C $300 for 8 months; they gain $400. What is the share of each?

2. A, B and C trade together: A put in $500 for 2 months, B $350 for 5 months, and C $120 for 1 year; they gained $450. What is the share of each?

3. A, B and C trade in company: A put in $450 for 5 months, B puts in $350 for 6 months, and C $1000 for 3 months; they gain $488.75. What is the share of each?

4. A, B and C trade together: A put in $500 for 3 months, B puts in $600 for 2½ months, and C puts in $300 for 5 months; they gain $600. What is the share of each?

5. A, B, C and D trade in company: A puts in $1000 for one year, B puts in $600 for 9 months, C $500 for 6 months, and D $1000 for 3 months; they gained but $80. What is the share of each?

6. A, B and C formed a joint stock: A puts in $1200 for 7 months, B puts in $1000 for 6 months, and C $800

for 8 months. When they separate they find that they have lost $500. How must this loss be divided among them?

7. A and B form a joint stock: A put in $350 and B $400. Four months later, C joined them with a capital of $500; and at the end of the year they find that they have gained $240. What is the share of each?

[*Remark.* A and B's stock are to be multiplied each by 12, because each of their stocks has been employed 12 months; but C's stock ($500) is only to be multiplied by 8, because it has been employed but 6 months.]

8. A has been carrying on a profitable business for 6 months, with a capital of $4000. At the end of this time he is joined by B, with a capital of $5000; and 3 months later, by C, with an additional capital of $2000. After all three had been trading in company for one year, they settle their accounts, and find a clear gain of $8000. How is this gain to be divided among the three partners?

[*Remark.* A's money was in trade 21 months, B's was in trade but 15 months, and C's only 12 months. The rest is similar to the preceding problems.]

9. A, B and C formed themselves into a trading company: A put in $800, B $1000, and C $1200. At the end of 3 months, A has occasion to withdraw $200 from the company; and one month later, B withdraws $400: C suffers his money to remain. At the end of two years from the commencement of the establishment, they balance their accounts, and find that they have gained $900. How must this gain be divided among them?

[*Remark.* $800 multiplied by 3, - - - = 2400
Added to $600 multiplied by 21, - - - = 12600

Give A's stock multiplied by its time, - - = 15000

$1000 multiplied by 4, - - - - - = 4000
Added to $600 multiplied by 20, - - - = 12000

Give B's stock multiplied by its time, - - = 16000

Finally, 1200 multiplied by 24 is C's stock. The rest is *similar to the* preceding problems.]

10. A, B and C form a joint stock: A puts in $2000, B $2500, and C puts in $3000. Six months after they had commenced business, A is obliged to withdraw $500; and one year later, B withdraws $500: C on the contrary added at the same time $500 to his stock. At the expiration of 3 years from the time they first commenced business, they balance their accounts, when they find that the clear gain amounts to $4850. How must this gain be divided among them?

11. A, B and C form themselves into a trading company: A put in $4000, B $3500, and C $4500. Six months later, A increased his stock by $500, B increased it by $1000; but C is obliged to withdraw $2000. At the end of one year from the time when they first commence business, they separate, when they find that they have lost $1000 in the business. What is each one's share in the loss?

12. A commences a profitable business with a capital of $2500; 3 months later he is joined by B, with a capital of $4000; and 6 months later by C, with a capital of $3500. At the end of 3 years from the time A began to trade, they balance their accounts, and find that they have gained $1574. What is the share of each?

ALLIGATION MEDIAL

Is a rule which teaches to find the mean price of certain things, when their quantity and the price of each are given.

Rule. As the sum of all the quantities is to their whole value, so is any part of them to its mean price.

Example. A vintner mixed together three different kinds of wine, viz: 3 casks at $40 per cask, 3 casks at $50, and 3 ditto at $60 per cask.

Now, supposing all these casks to hold equal quantities of wine, what is the mean price per cask?

40	50	60	and	120
3	3	3		150
——	——	——		180
120	150	180		——

Hence we have the proportion $450.

9 : 450 : : 1 :

9)450(50. Ans. $50 per cask.

Let the pupils now do the following sums:

1. A goldsmith mixed three different kinds of gold, viz: 4 oz. of 14 carats fine,* 5 oz. 16 carats fine, and 6 oz. 18 carats. How many carats fine will be the mixture; or, in other words, how many carats fine gold will be in 1 oz. of the mixture?

2. I mix together three different kinds of sugar, viz: 450 at 6 cents per lb., 740 at 7 cents per lb., and 470 lbs. at 8 cents per lb. What is the value of one pound of the mixture?

3. A grocer mixes together two different kinds of molasses; the first kind is worth only 28 cents per gallon, but the second is worth 35. The mixture contains one gallon of the first kind to two gallons of the second. What is the mixture worth per gallon?

4. A grocer mixed 40 gallons of water with 160 gallons of wine, at $1.00 per gallon. What is the value of one gallon of the mixture?

5. Having three different kinds of flour, I wish to know the price of the following mixture: 20 bushels at 78 cents per bushel, 30 bushels at 75 cents per bushel, and 20 bushels at 50 cents per bushel?

6. Bought a lot of wine: 4 dozen Madeira at $10 per dozen, 3 dozen port at $7.50 per dozen, 5 dozen of old hock at $10.50 per dozen, and 4 dozen of claret at $6 per dozen. What was the mean price per dozen? What was the mean price per bottle?

7. A grocer mixed together 3 different kinds of coffee, viz: 146 lbs. of Java at 10 cents per lb., 245 lbs. of Mocca at 20 cents per lb., and 300 lbs. of St. Domingo at 12 cents per lb. What is the mean price of the mixture per lb.?

8. What is the mean price per bushel of the following mixture of grains: 40 bushels of wheat at 70 cents per bushel, 25 bushels of rye at 50 cents per bushel, 24 bushels of barley at 30 cents a bushel, and 60 bushels of corn at 25 cents per bushel?

---

* *This means*, 14 oz. out of 24 pure gold.

9. A refiner has been melting together 3 different kinds of silver, viz: 14 oz. 6 carats fine, 20 oz. 8 carats fine, and 10 oz. 9 carats fine. How many carats fine is 1 oz. of the mixture?

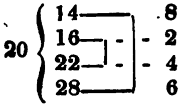
10. A grocer mixes 14 gallons of brandy, at $2.50 per gallon, with 6 gallons of water. What is the price per gallon of the mixture?

ALLIGATION ALTERNATE.

This rule is just the reverse of the preceding rule, and teaches how to find what quantity of one or more things, whose value we know, must be mixed with a given quantity of another, to produce a mixture of a given value.

Rule. Write the prices of the different things under one another, and connect by a line each price which is less than that of the mixture with one or more of the prices that are greater than it. Then write the difference between the required price and each of those that are less, by the side of the larger one with which it is connected; and the difference between each larger price and the price of the mixture by the side of the less with which it happens to be connected: the difference, or, if there are several, the sum of the differences that stand by the side of each price, is the quantity that must be taken of it to compose the required mixture.

Example. A grocer wishes to mix wines which are 14, 16, 22 and 28 shillings a gallon, in such a way that the mixture shall be worth 20 shillings a gallon.

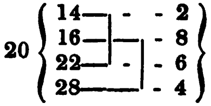


Answer,.
8 gallons at 14*s.*
2 " " 16*s.*
4 " " 22*s.*
6 " " 28*s.*

After the prices 14, 16, 22 and 28 are written one under another, connect any two of them (say 16 and 22, and 14 and 28) by a line. The required price of the mixture being 20, find the difference between 14 and 20, which being 6, put this number down by the side of the larger number 28, with which the number 14 is connected; and the difference between 28 and 20, which is 8, write by the side of the smaller number 14, with which 28 are connected. In the same manner find the difference between 16 and 20, which is 4, and put it by the side of the larger number 22; while the difference between 22 and 20, which is 2, is put down by the side of 16. The numbers 8, 2, 4 and 6 mark the number of gallons which must be taken respectively of each kind of wine.

To prove it, we need only calculate the mean price of 8 gallons at 14 shillings per gallon, 2 gallons at 16, 4 gallons at 22, and 6 at 28 shillings per gallon, which it is easily found is 20 shillings per gallon.

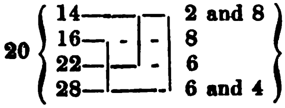
The same sum may also be solved in the following manner:



Answer,

2	gallons at	14	shillings,
8	"	16	"
6	"	22	"
4	"	28	"

Or, also,



Ans.

10	gals. at	14	shil.	per gal.
8	"	16	"	"
6	"	22	"	"
10	"	28	"	"

And so on in a variety of ways, according to the different manner in which we connect or combine the different prices.

In the last example, for instance, we have connected 14 with two of the higher prices, 22 and 28; and the 28 with two of the lower prices, 16 and 22. It is for this reason we have taken the differences, 2 and 8, between 20 and 22, and 20 and 28, and have written them by the side of 14; and in the same manner have we taken the two differences 6 and 4 between 14 and 20, and 16 and 20, and have written them by the side of 28. A great number of solutions may in this way be obtained, unless there are some other conditions given, by which the problem assumes a more determined nature. But sums of this kind are much more easily solved by the aid of Algebra, [See Grund's *Exercises in* Algebra, Section X.] for which reason we shall *omit them in this* part.

Let the pupils do the following sums for practice:

1. A grocer wishes to mix 4 different kinds of wine, to obtain a mixture which shall be worth $1.00 per gallon. The first kind is worth 75 cents per gallon, the second is worth 50 cents a gallon, the third $1.25, and the fourth is worth $2.00 per gallon. How many gallons must he take of each kind?

2. A grocer wishes to mix three different kinds of sugar, in order to obtain a mixture worth 8 cents a pound. The first kind is worth 7 cents per pound, the second 6 cents, and the third is worth 10 cents. How many pounds must he take of each kind to obtain the desired mixture?

3. A silversmith has three different kinds of silver, 8, 10 and 14 carats fine. How many ounces must he take of each kind to obtain a compound which shall be 12 carats fine?

4. A goldsmith has 4 different kinds of gold, 14, 16, 20 and 22 carats fine; he wishes to obtain from them a mixture which shall be 18 carats fine. How many ounces must he take of each kind?

5. A trader wishes to mix 4 different kinds of coffee, in such a way that he may obtain a mixture worth 12 cents per lb. The first kind is worth but 8 cents a pound, the second but 10, but the third and fourth kinds are each worth 14 cents per lb. How many pounds ought he to take of each kind?

6. A grocer has two different kinds of wine; the first is worth $1.00 per gallon, and the second is worth $2.00 per gallon. How many gallons of water (which cost nothing) must he mix with these wines to obtain a mixture worth 75 cents per gallon?

7. How many gallons of water must be mixed with brandy worth $2.00 per gallon, to obtain a mixture worth $1.50 per gallon?

8. How many gallons of water must be added to 14 gallons of wine, worth $1.00 per gallon, to make the mixture worth 50 cents per gallon?

9. How many gallons of water must be added to 20 gallons of wine, worth $1.00 per gallon, to obtain a mixture worth 75 cents a gallon?

10. How many gallons of wine, worth $1.50 per gallon, must be added to 40 gallons of water, to make the mixture worth $1.00 per gallon?

11. How many gallons of water must be added to 40 gallons of wine, worth $2.00 per gallon, and 20 gallons worth $1.50 per gallon, to procure a mixture worth $1.00 per gallon?

12. How much wine at 50 cents a gallon must be added to 40 gallons, worth $1.00 per gallon, to obtain a mixture worth 75 cents per gallon?

13. How much copper (which in comparison to silver is worth nothing) must be added to 5 oz. of 10 carats fine silver, to obtain a mixture but 8 carats fine?

PRACTICE

Is a contraction of the preceding rules, and more especially of the rule of three. It consists principally in solving questions in a more direct manner, by avoiding large multiplications and divisions, in whose stead we add and subtract aliquot parts, such as halves, thirds, fourths, &c. As its name indicates, it can only be acquired by *practice*, and it would therefore be needless to charge the memory with rules, which suggest themselves, as it were, spontaneously to the man of business, and which are productive of little or no good to the beginner, until he has made himself familiar with them.

We shall now give a number of examples, which may serve for an illustration.

Example I. What will 48 yards of muslin come to, at 75 *cents a yard?*

½ dollar)48
—
¼ dollar is ½ of ½)24
12
—
$36 Ans.

Instead of multiplying 48 yds. by 75 cents, we may contract the sum, by taking 48 half dollars and adding to them 48 quarter dollars: 75 cents being ½ and ¼ of 1 dollar.

Example II. What is the price of 48 yards of muslin, at 62½ cents per yard?

At ½ dollar)48
—
12½ cts. are ¼ of ½ dol.)24
6
—
$30 Ans.

In this example, we take first, 48 half dollars, which is equivalent to multiplying by 50 cents. Then, because 12½ cents are ¼ part of 50 cents, we divide the answer of 50 cents again by 4, and add the quotient, 6, to the 24 dollars. The answer is $36.

Example III. What is the price of 36 barrels of beer, at $3.75 per barrel?

36
3
——
108
½ of 36 - - 18
½ of 18 - - 9
——
Answer $135

In this example, instead of multiplying by 3.75, I first multiply by 3, for the price of three dollars; then I take ½ of 36 for 50 cents; and for the remaining 25 cents of the price, I take half the price of 50 cents.

Example IV. What is the value of 8 cwt. 3 qrs. 14 lbs., at $50 per cwt.?

50.00
8
———
400.00
2 qrs. = ½ of $50.00 25.00
1 qr. = ½ of 25.00 12.50
14 lbs. = ½ of 12.50 because 14 lbs. = ½ qr. 6.25
———
Answer $443.75

In this example, instead of performing a sum in compound multiplication, we first multiply $50 by 8, to obtain the price of the 8 cwt. We then obtain the price of 2 qrs. by taking half of 50, (the price of the whole cwt.) The price of 1 quarter is afterwards obtained by taking half the price of 2 quarters; and the value of 14 lbs. is found by taking again half of 1 quarter. These respective prices added together, are evidently the cost of 8 cwt. 3 qrs. 14 lbs., and consequently our answer.

Example V. What is the value of 450 yards of tape, at 2 pence sterling per yard?

6)450
——
Ans. 75 shillings,
or £3 15*s*.

Two pence being $\frac{1}{6}$ of a shilling, it is evident that we need only divide 450 by 6, to obtain the answer in shillings; which being 75, is equivalent to £3 15*s*.

Example VI. What is the price of 140 yards of cloth, at 15 shillings 6*d*. per yard?

	£.	*s*.
For 10 shillings, ($\frac{1}{2}$ of 140)	70	00
For 5 shillings, $\frac{1}{2}$ of £70,	35	00
For 6 pence, $\frac{1}{10}$ of 5*s*.	3	10
Answer	£108	10

Take the price of 140 at 10*s*. or $\frac{1}{2}$ pound per yard — this is £70.— Again, for 5 shillings the price must be $\frac{1}{2}$ of the price of 10 shillings. And for 6 pence, which are $\frac{1}{2}$ shilling, the price must be $\frac{1}{10}$ of 5 shillings, because 10 sixpences make 5 shillings. £108 is the answer.

Example VII. What is the price of 140 yards of broadcloth, at £1 12*s*. 6*d*. per yard?

	£.	*s*.
For £1 - -	140	00
For 10*s*. ($\frac{1}{2}$ pound)	70	00
For 2*s*. ($\frac{1}{5}$ of 10*s*.)	14	00
For 6*d*. ($\frac{1}{4}$ of 2*s*.)	3	10
Total answer	£227	10

At £1 per yard 140 yds. cost evidently £140. Now as 10 shillings are $\frac{1}{2}$ of 1 pound, we must for the 10 shillings take $\frac{1}{2}$ of 140. Again, because 2 shillings are $\frac{1}{5}$ of 10 shillings, we must take $\frac{1}{5}$ part of £70, (which is the price for 10 shillings.) Finally, the remaining sixpence being $\frac{1}{2}$ of 1, or $\frac{1}{4}$ of 2 shillings, we take the 4th part of £14 for the sixpence; consequently, the whole cost of the 140 yards is £227 10*s*.

Example VIII. What is the cost of 3 cwt. 3 qrs. 21 lbs. at £3 15*s*. 6*d*. per cwt.?

	£.	s.	d.	
Then	3	15	6	
			3	
	11	6	6	price of 3 cwt.
⅙ of 3 cwt.	1	17	9	price of 2 qrs.
½ of 2 qrs.		18	10½	price of 1 qr.
½ of 1 qr.		9	5¼	price of 14 lbs.
½ of 14 lbs.		4	8½	price of 7 lbs.*
Total answer	£14	17	3¼	

Example IX. What is the value of 3 oz. 16 pwt. of silver, at $3.50 an ounce?

	$3.50	
	4	
	$14.00	price of 4 oz.
⅛ of 4 oz. - -	1.75	price of 10 pwts.
½ of 10 pwts. -	87½	price of 5 pwts.
⅕ of 5 pwt. - -	17½	price of 1 pwt. nearly.
Total answer	$16.80.	

Example X. What is the price of 15 gallons 2 qts. 1 pt. of ale, if the barrel (containing 36 gallons) cost $4.50 cents?

⅓	of the price of	1 barrel,	$1.50,	will be	the price of	12 gals.
¼	"	12 gals.	37½	"	"	3 "
⅙	"	3 "	6¼	"	"	2 qts.
½	"	2 quarts	3⅛	"	"	1 pint.

The total answer, therefore, is $1.97 cents, (⅞ of 1 cent being counted for 1.)

These few examples will sufficiently show the manner in which questions of this kind are solved by practical men, and it will be useful to let the pupils do the following sums:

1. What is the price of 140 yards, at 50 cents a yard?

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* *The fraction,* ⅛ *of a* penny, obtained by taking half of ¼, may *be omitted on* account of its smallness.

2. What is the price of 60 yards, at 75 cents a yard?
3. What is the price of 48 yards, at 62½ cents a yard?
4. What is the price of 36 yards, at 37½ cents a yard?
5. What is the price of 160 yards, at 25 cents a yard?
6. What is the price of 40 yards, at 12½ cents a yard?
7. What is the price of 420 yards, at 2 New-England shillings (33⅓ cents) a yard?
8. What, that of 321 yards, at 4 shillings a yard?
9. What is the price of 640 yards, at 6¼ cents a yard?
10. What is the price of 140 yards, at 87½ cents a yard?
11. What is the price of 50 yards, at 20 cents a yard?
12. What is the price of 100 yards, at 40 cents a yard?
13. What is the price of 120 yards, at 60 cents a yard?
14. What is the price of 320 yards, at 80 cents a yard?
15. What is the price of 540 yards, at 75 cents a yard?
16. What is the price of 140 yards, at 62½ cents a yard?
17. What is the price of 320 yards, at 37½ cents a yard?
18. What is the price of 230 yards, at 87½ cents a yard?
19. What is the price of 148 yards, at 12½ cents a yard?
20. What is the price of 36 yards, at 1 shilling a yard?
21. What is the price of 144 yards, at 2 shillings a yard?
22. What is the price of 126 yards, at 3 shillings a yard?
23. What is the price of 240 yards, at 4 shillings a yard?
24. What is the price of 480 yards, at 5 shillings a yard?
25. What is the price of 600 yards, at 6 shillings a yard?
26. What is the price of 142 yards, at 7 shillings a yard?
27. What is the price of 480 yards, at 8 shillings a yard?
28. What is the price of 390 yards, at 9 shillings a yard?
29. What is the price of 328 yards, at 10 shillings a yard?
30. What is the price of 248 yards, at 11 shillings a yard?
31. What is the cost of 246 lbs., at 1 penny per lb.?

32. What is the cost of 246 lbs., at 2 pence per lb.?

33. What is the cost of 320 lbs., at 3 pence per lb.?

34. What is the cost of 360 lbs., at 4 pence per lb.?

35. What is the cost of 120 lbs., at 5 pence per lb.?

36. What is the cost of 489 lbs., at 6 pence per lb.?

37. What is the cost of 348 lbs., at 7 pence per lb.?

38. What is the cost of 480 lbs., at 8 pence per lb.?

39. What is the cost of 390 lbs., at 9 pence per lb.?

40. What is the cost of 320 lbs., at 10 pence per lb.?

41. What is the cost of 120 lbs., at 10 pence per lb.?

42. What is the price of 4 cwt. 3 qrs., at $45 per cwt.?

43. What is the price of 3 cwt. 3 qrs. 14 lbs., at $48.50 per cwt.?

44. What is the price of 5 cwt. 2 qrs. 21 lbs., at $36.75 per cwt.?

45. What is the price of 6 cwt. 1 qr. 24 lbs., at $45 per cwt.?

46. What is the price of 5 cwt. 3 qrs. 25 lbs., at $46.48 per cwt.?

47. What is the price of 14 cwt. 2 qrs., at $145 per cwt.?

48. What is the price of 14¾ hhds., at $50 per hhd.?

49. What is the price of 4 hhds. 27 gals., at $63 per hhd.?

50. What is the price of 4 hhds. 27 gals., at $54 per hhd.?

51. What is the price of 1 hhd. 30 gals. 2 quarts, at $65.75 per hhd.?

52. What is the price of 3 lbs. 8 oz. 15 pwts. of silver, at $3.25 an ounce?

53. What is the price of 2 oz. 14 pwts. 20 grains of gold, at 62 cents per pwt.

54. What is the price of 36 gals. of wine, at $120 per hhd.?

55. What is the price of 39 gals. of wine, at $45 per hhd.?

56. What is the price of 45 gals. of wine, at $35 per hhd.?

57. What is the price of 56 gals. of wine, at $36.50 per hhd.?

58. What is the price of 35 gals. of wine, at $42.50 per hhd.?

59. What is the price of 14 gals. 2 quarts, at $84 per hhd.?

60. What is the price of 7 gals. 3 qts. 1 pt., at $240 per hhd.?

61. What is the price of 2 quarts, at $126 per hhd.?

62. What is the price of 15 pwts. 16 grains, at 75 cents per pwt.?

63. What is the price of 5 oz. 8 pwts., at $2.80 an ounce?

64. What is the price of 3 oz. 12 pwts. 15 grs., at $4 an oz.?

65. What is the price of 2 oz. 11 pwts. 13 grains, at $3.75 cents an ounce?

66. What is the cost of 7 lbs., at $140 per cwt.?

67. What is the cost of 7 lbs. 8 oz., at $360 per cwt.?

68. What is the cost of 21 lbs. 10 oz., at $480 per cwt.?

69. What is the cost of 4¾ yards, at $3.25 per yard?

70. What is the cost of 1⅞ of a yard, at $4.50 per yard?

71. What is the price of 1 nail, at 80 cents a yard?

72. What is the cost of 5 bush. 3 pecks, at 60 cts. per bush.?

73. What is the price of 4 bushels 2 pecks 4 quarts, at 50 cents per bushel?

74. What is the price of 7 bushels 3 pecks 7 quarts, at 75 cents per bushel?

75. What is the price of 6 bushels 3 pecks 7 quarts 1 pint, at $1.20 per bushel?

76. At $7 a week, what are my wages for 3 weeks 4 days?

77. At $7 a week, what are my wages for 7 weeks 5 days?

78. At $12 a week, what are my wages for 3 weeks 5 days?

79. At $15 a week, what do 3 weeks' 5 days' wages amount to?

80. At $14 a week, what do 5 weeks' 4 days' wages amount to?

81. At $30 a month, what do 15 days' wages amount to?*

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* *In this sort of calculations, the month is generally averaged 30 days, and the year 360 days.*

82. At $45 a month, what do 20 days' wages amount to?

83. At $35 a month, what do 25 days' wages amount to?

84. At $60 a month, what do 35 days' wages amount to?

85. At $65 a month, what do 45 days' wages amount to?

86. At $75 a month, what do 3 months' 15 days' wages amount to?

87. At $80 a month, what do 2 months' 20 days' wages amount to?

88. At $90 a month, what do 3 months' 25 days' wages amount to?

89. A clerk's salary is $1200 a year. What is this for 3 months?

90. A clerk's salary is $1000 a year. What is this for 7 months? what for 3 months? what for 2 months? what for 15 days? what for 10 days?

91. A gentleman's income is $2400 per annum. What is this for 4 months? what for 2 months? what for 3 days?

92. At $25 per acre, what is the value of 2 roods? what that, of 30 perches?

93. At $40 an acre, what is the value of 3 roods?

94. At $50 an acre, what is the value of 3 rods 25 per.?

95. At $5 an acre, what is the value of 20 perches?

96. At $10 an acre, what is the value of 25 perches?

97. At 3*s*. 6*d*. a yard, what is the cost of 5¾ yards?

98. At 4*s*. 3*d*. per yard, what is the cost of 3½ yards?

99. At £1 15*s*. per barrel, what is the cost of 14 barrels? what that, of 3 barrels 18 gallons?

100. At 15*s*. 6*d*. per barrel, what is the cost of 3 barrels 12 gallons?

101. At 10*s*. 9*d*. per barrel, what is the value of 5 barrels 27 gallons?

102. At 8*s*. 6*d*. per barrel, what is the value of 4 barrels 16 gallons?

103. At £3 15*s*. per ton, what is the value of 14 tons 10 cwt. 3 quarters?

104. At £2 15*s*. 6*d*. per ton, what is the value of 10 tons 9 cwt.?

105. At £4 10*s*. 9*d*. per ton, what is the value of 15 tons 4 cwt.?

106. At £5 15*s*. 6*d*. per ton, what is the value of 10 tons 3 cwt. 3 qrs.?

107. At £4 12*s*. per ton, what is the value of 5 cwt. 3 qrs. 14 lbs.?

108. At £5 12*s*. 6*d*. per ton, what is the value of 14 cwt. 2 qrs. 7 lbs.?

109. At £12 10*s*. 6*d*. per ton, what is the value of 12 cwt. 3 qrs. 21 lbs.?

110. At £25 per cwt., what is the value of 7 lbs.? what that of 1 lb.?

111. At £50 per cwt., what is the value of 1 qr.? what that of 14 lbs.? what that of 7 lbs.? what that of 1 lb.?

112. At £24 10*s*. per hhd., what is the value of 21 gallons? what that of 7 gallons?

113. At £12 10*s*. 6*d*. per hhd., what is the value of 35 gallons? what that of 5 gallons? what that of 1 gallon?

114. At 6*d*. per yard, what is the cost of 1 quarter? what that of 1 nail?

115. At £4 10*s*. per acre, what is the cost of 3 roods?

116. At £5 10*s*. 6*d*. per acre, what is the cost of 24 acres 3 roods?

117. At £4 10*s*. 3*d*. per acre, what is the value of 25 acres 3 roods 20 perches?

118. At £5 8*s*. 2*d*. per acre, what is the value of 60 acres 2 roods 25 perches?

119. At £14 12*s*. 4*d*. per acre, what is the value of 25 acres 1 rood 24 perches?

120. Take $\frac{3}{4}$ of £14 6*s*. 4*d*.

121. Take $\frac{5}{6}$ of £34 4*s*.

122. Take $\frac{7}{8}$ of £24 8*s*. 4*d*.

EXCHANGE.

a. With Great Britain.

Rule. The pound sterling is valued at $4.44.4, or, which is the same, $\frac{40}{9}$ dollars; because 40 divided by 9 give $4 44 cents 4 mills. This is the intrinsic value of the pound sterling at par; but in settling accounts between this country and Great Britain, or in buying bills of exchange on London or Liverpool, it is rarely ever the case that British money is obtained at that rate. The exchange on England is therefore said to be variable, and averages sometimes upwards of 5, 10, 15 and even 20 per cent advance. If, on the contrary, there should be a great abundance of British bills, and little demand for them, or a greater demand for American goods or produce, then this would depress the exchange on England, by which means English bills would fall *below par;* that is, in buying a bill on London or Liverpool, the seller or disposer of the bill would allow a discount on the value of the bill, calculated at $4.44.4 per pound sterling. (In a similar manner varies the exchange on Holland, France, Germany, and all other commercial places.)

Rule for converting English money into American currency, at par.

Change the shillings and pence into a decimal fraction of pound, which multiply by 40, and divide by 9. The quotient is the answer in dollars and cents.

Example. Let it be proposed to change £456 15*s.* 6*d.* into dollars and cents, the exchange on England being supposed at par.

£. *s.* *d.* £. 456 15 6 = 456.775 40 9)18271.000 2030.11.1 Ans. $2030.11 cts. 1 ml.	Then, because 15*s.* 6*d.* are equal to 0.775 of £1, add this decimal fraction to the pounds, multiply by 40, and divide by 9. The quotient, 2030.11, are the dollars and cents of the answer.

If the exchange or value of a bill on England is to be calculated at a given rate of advance, or discount, then it is *only necessary* to find the interest or discount of the value of the bill at par, which in case of *advance* must be added, and in case of *discount*, subtracted from the amount of the bill. When a bill is to be disposed of at so much discount, the question is similar to those we have explained, page 140; and the whole amount may at once be found by Rule II., laid down on that page. We shall now give an example for each case.

Example I. Let us suppose the above bill of £456 15*s.* 6*d.* is to be negotiated at an advance of 8 per cent. What is the amount that must be paid for it in Federal money?

$2030.111
8
162.40888
2030.111
2192.52
Ans. $2192.52 cts.

Then, taking 8 per cent on the value of the bill at par, we add to it the advance, (or interest,) amounting to $162 40 cents 8 mills; (the other decimals may be neglected.) The answer is $2192.52 cents nearly.

II. If the same bill was to be sold at a discount of 8 per cent,

108 : 100 : : 2030.11
100
108)203011.00(1879.93
108
950
864
861
756
1051
972
790
756
340
324
16
Ans. $1879 93 cents.

Then we should at once find its amount by the proportion,
108 : 100 : : 2030.11 :
as we have stated before, page 140.

The answer would be $1879.73.

Remark. The above rule of changing British money into dollars and cents, is one of so much occurrence in commercial towns, that a facility of solving similar questions becomes very desirous in young men engaged in mercantile business. For this purpose it will be well for them to acquaint themselves with an easy method for changing, *at sight*, a given number of shillings, pence and farthings into a decimal fraction of a pound. This may be done by the following easy

Rule. Take half the even number of shillings for your first decimal figure; then change the remaining pence and farthings all to farthings, making the resulting number your second and third places respectively; observing, however, to add 5 in the second place, if the number of shillings was odd; and 1 in the third place, when the farthings exceed 12, or 2 if they should exceed 37.

Example. Let it be proposed to change 19 shillings 4½ pence to a decimal fraction of a pound.

19*s*. 4½*d*.	Then half the even number of shillings is 9;
0.9	and the remaining pence reduced to farthings,
18	give 18 for the second and third decimal figures;
5	but the number of shillings being odd, it is
1	necessary to add 5 in the second place; and
——	the number of farthings exceeding 12, 1 must
Ans. 0.969	be added to the third figure.

A little incorrection in the last decimal figure is unavoidable, if we wish to obtain but 3 decimal figures; but then the error is so small, that in business transactions it may be entirely neglected.

Another Example. Let it be proposed to change 14 shillings 9¾ pence to a decimal fraction of a pound.

14*s*. 9¾*d*.	Here, half the even number of shillings is 7;
0.7	and the remaining 9¾*d*. reduced to farthings,
39	give 39 for the second and third decimal figures,
2	respectively; but the number of farthings ex-
——	ceeding 37, we add 2 to the third figure. The
Ans. 0.741	answer is 0.741 of a pound.

With the assistance of this rule, it will be easy to convert *any given* number of pounds, shillings and pence, sterling first into a decimal fraction of pounds, and thence, by the rule given on page 175, into Federal money.

Let the pupils now do the following sums:

1. What is the value in Federal money, of £500 10*s.* 6*d.* sterling, at 5 per cent advance?

2. What is the value of £547 16*s.* 8*d.* sterling, at par?

3. What is the value in Federal money of £100 at par?

4. What is the value in Federal money of £175 13*s.* 6½*d.*, at 8 per cent advance?

5. What is the value in Federal money of a bill of £126 14*s.* 7½*d.* sterling, at the rate of 10 per cent advance?

6. What is the amount in Federal money of a bill on Liverpool, for £147 13*s.* 6¼*d.* sterling, exchange being 5 per cent advance?

7. What is the value in Federal money of a bill on London, for £483 17*s.* 6½*d.*, at the rate of 7½ per cent advance?

8. What is the value in Federal money of £1474 15*s.* 9¾*d.*, at the rate of 15½ per cent advance?

9. What sum of money must be paid in dollars and cents for a bill on London of £475 13*s.* 6*d.*, exchange being calculated at the rate of 7 per cent?

10. What is the value in Federal money of a bill of £475 14*s.* 5*d.*, exchange being calculated at par?

11. What is the value in Federal money of a bill on London of £1000, exchange being calculated at par?

			£.	*s.*	*d.*
12. At 6 per cent advance, how many dollars must be paid for			140	10	6
13. At 7½ per cent advance, how many for			75	15	4
14. At 8 per cent	"	"	110	6	8
15. At 9 per cent	"	"	95	4	4
16. At 10 per cent	"	"	134	3	6
17. At 11 per cent	"	"	456	2	8
18. At 12 per cent	"	"	75	3	9
19. At 14 per cent	"	"	475	6	4
20. At 15 per cent	"	"	175	7	3
21. At 20 per cent	"	"	489	12	6

			£.	s.	d.
22. At 4½ per cent discount, what is the value, in sterling money, of			494	17	6
23. At 5½ per cent discount,	"	"	745	3	4½
24. At ½ per cent "	"	"	69	15	6
25. At ¾ per cent "	"	"	48	17	9½
26. At ⅝ per cent "	"	"	146	19	6¾
27. At 1½ per cent "	"	"	417	17	3½
28. At 3½ per cent "	"	"	145	18	7½
29. At 4 per cent "	"	"	365	17	5½
30. At 5 per cent "	"	"	49	13	6
31. At 10 per cent "	"	"	128	17	9
32. At 12 per cent "	"	"	2417	14	6
33. At 11 per cent "	"	"	348	19	7
34. At 8¼ per cent "	"	"	68	9	8
35. At ¼ per cent "	"	"	99	9	3½
36. At ⅛ per cent "	"	"	74	14	4½

When the question is the reverse, that is, when the question is asked, how many pounds, shillings and pence, sterling, must be paid or may be bought for a certain sum of Federal money, then the process is also the reverse, as will be seen from the following

Rule. Multiply the number of dollars and cents by 9, and divide the product by 40. This quotient will be a decimal fraction of pounds sterling, from which the shillings and pence are easily obtained, by the rule laid down (page 105) for the reduction of decimal fractions to units of a lower denomination.

Example. Let it be proposed to find what number of pounds, shillings and pence may be bought for $5696.45, exchange being calculated at par?

$5696.45
9
4|0)5126|8.05(128.145
4 20
11 2.900
8 12
32 10.800
32
06
4
18
16
20
Ans. £128 2*s.* 11*d.* nearly.

Then, $5696.45 multiplied by 9 and divided by 40, give £128.145. Now the decimal fraction 0.145 may be changed into shillings, by multiplying by 20, the answer being 2*s.*; and the remaining decimal fraction 0.9 of a shilling, is changed into pence by multiplying it by 12. The total answer is £128 2*s.* 11*d.*; because the remaining 0.8 is nearly 1 penny, which is sufficiently correct for mercantile purposes.

If the exchange be so many per cent *advance* on English money, then it is best to reduce first the proposed sum of Federal money to the par of exchange, from which the English money is afterwards obtained by the preceding rule. This is done by the proportion, $100 *with the rate of advance, is to* $100, *as the proposed sum is to its value at the par of exchange.*

Example. Let it be proposed to find what sum of English money may be bought for $5000, when exchange on England is 10 per cent advance.

$110 : $100 : : $5000 :
100
11|0)50000|0(4555.55½
$4555.555
9
4|0)4099|9.995(1024.9998
20
19.9960
12
£. s. d. f. 11.9520
Ans. 1024 19 11 $3\frac{8}{10}$, 4
Or £1025 nearly. 3.8080

Then we should first find what sum of money at the par of exchange is equivalent to $5000, at 10 per cent advance. This we find to be $4555.55½; that is, $4555.55½ will pay for as many pounds sterling at par, as $5000 will at 10 per cent advance. All that remains now to be done, is to change the $4555.55½. The answer is £1025, nearly.

If, instead of so many per cent advance, we were to find what sum of British currency may be bought for a given number of dollars at a given rate of discount, then it is only necessary to find the equivalent number of dollars at the par of exchange, from which the British currency is afterwards obtained as in the preceding example.

The equivalent number of dollars at the *par* of exchange is found by the following proportion. $100 are to $100 with the rate of discount, as the proposed sum of money is to the answer.

Example. Let it be required to find what sum of English money may be obtained for $5000, at the rate of 10 per cent discount.

```
100 : 110 : : 5000 :
                 110
      100)5500.00(5500
Then $5500
         9
     ─────
   4|0)4950|0(1237.50
                   20
                ─────
                10.00
Ans. £1237 10s.
```

Then, by the proportion 100 : 110 : : 5000 : we obtain $5500, which, in this case, is the number of dollars which, at par, are equivalent to $5000, at 10 per cent discount. This being once found, we easily obtain from it the English money, by multiplying by 9 and dividing by 40, as in the preceding example. Answer £1237 10s.

Let the pupils now do the following sums for the sake of practice:

1. How many pounds, shillings and pence may be bought for $473.75 at par?

2. How many pounds, shillings and pence may be paid with $3474.50, at par?

3. How many pounds, shillings and pence may be paid with $734, at the par of exchange?

4. How many pounds, shillings and pence may be bought for $1750, at the par of exchange?

5. How many pounds, shillings and pence are paid with $4500, at the rate of 4 per cent advance?

6. How many pounds, shillings and pence are paid with $3245.75, at the rate of 6½ per cent advance?

7. How many pounds, shillings and pence are paid with $4785, at the rate of 6 per cent advance?

8. How many pounds, shillings and pence are paid with $500, at the rate of 7 per cent advance?

9. How many pounds, shillings and pence are paid with $750, at the rate of 9 per cent advance?

10. How many pounds, shillings and pence are paid with $1250, at the rate of 9¾ per cent advance?

11. How many pounds, shillings and pence are paid with $750, at the rate of 10 per cent advance?

12. How many pounds, shillings and pence are paid with $843.75, at the rate of 8½ per cent advance?

13. How many pounds, shillings and pence are paid with $844, at the rate of 11 per cent advance?

14. How many pounds, shillings and pence are paid with $745, at the rate of 11½ per cent advance?

15. How many pounds, shillings and pence are paid with $989.50, at the rate of 12 per cent advance?

16. How many pounds, shillings and pence are paid with $1000, at the rate of 15 per cent advance?

17. How many pounds, shillings and pence are paid with $3200, at the rate of 16 per cent advance?

18. How many pounds, shillings and pence are paid with $10,000, at the rate of 20 per cent advance?

19. How many pounds, shillings and pence are paid with $100,000, at par?

20. How many pounds, shillings and pence are equivalent *to $500,000,* at par?

21. How many pounds, shillings and pence are equivalent to $200,000, at par?

22. How many pounds, shillings and pence are equivalent to $1,000,000, at par?

23. How many pounds, shillings and pence are equivalent to $1000, at 3 per cent discount?

24. How many pounds, shillings and pence are equivalent to $4000, at the rate of 4 per cent discount?

25. How many pounds, shillings and pence are equivalent to $1345, at 5 per cent discount?

26. How many pounds, shillings and pence are equivalent to $2775, at 6 per cent discount?

27. How many pounds, shillings and pence are equivalent to $1744.50, at 7 per cent discount?

28. How many pounds, shillings and pence are equivalent to $247.88, at 6½ per cent discount?

29. How many pounds, shillings and pence are equivalent to $544.75, at 7½ per cent discount?

30. How many pounds, shillings and pence are equivalent to $600, at the rate of 5½ per cent discount?

31. How many pounds, shillings and pence are equivalent to $509.44, at the rate of 8 per cent discount?

32. How many pounds, shillings and pence are equivalent to $8000, at the rate of 10 per cent discount?

33. How many pounds, shillings and pence are equivalent to $10,000, at the rate of 8½ per cent discount?

34. How many pounds, shillings and pence are equivalent to $6000, at the rate of 15 per cent discount?

35. How many pounds, shillings and pence are equivalent to $5000, at the rate of 9 per cent discount?

36. How many pounds, shillings and pence are equivalent to $10,000, at 20 per cent discount?

b. *French Money.*

Money accounts in France, are kept in francs and centimes. Each centime being $\frac{1}{100}$ part of a franc. The intrinsic value of 1 franc in Federal money is 18¾ cents. Hence in order to change francs into Federal money, at the par of exchange, it is only necessary to multiply the number of francs by 18¾, and divide by 100, or which is the same, to point off 2 decimals, and the quotient is the answer in dollars and cents.

If, on the contrary, it were required to change a given number of dollars and cents into francs and centimes, then the process would be the reverse, and we should have to divide by 18¾, which would give us at once the answer in francs and centimes.

The advance and discount on French money, might be calculated in the same manner as in the exchange on England, but it is customary, in case of advance or discount, to name it on the number of cents paid for 1 franc.

Example. Let it be required to change 490.75 francs into Federal money, the exchange on France being calculated at par, viz. 18¾ cents to 1 franc. Then we should have to multiply 490.75 by 18¾, which is done by multiplying first by 18, and then taking the half of 490.75 and again ½ of that for the ¼. The product divided by 100, gives the answer. Ans. $92.01½ cents.

Francs 490.75
18¾
392600
49075
24537½
12268¾
$92.0155¾
Ans. $92.01½ cents. nearly.

```
  $4000
195)4000000(20512.82
    390
    ----
     1000
      975
      ---
       250
       195
       ---
        550
        390
        ---
        1600
        1560
        ----
          400
Ans. 20512 Francs and
82 centimes.
```

Another Example. Let it be proposed to find what number of francs and centimes may be bought for $4000, exchange being calculated at 19½ cents. Then, because $4000 are equal to 4000000 mills, and 195 mills make 1 franc, divide 4000000 by 195. The answer is 20812 francs and 82 centimes.

Let the pupils, for the sake of practice, do the following sums:

1. What is the value of 5000 francs, when the exchange on Paris is 18½ cents?
2. What is the value of 47000 francs, when the exchange on Paris is 19¾ cents?
3. What is the value of 1000 francs, when the exchange on Paris is 18¾ cents?
4. What number of francs may be bought for $3000, exchange being calculated at 19 cents?
5. What number of francs may be bought for $2500, exchange on Paris being calculated at 19½ cents?
6. What is the number of francs that may be bought for $5000, exchange on Paris being 18¾ cents?

Promiscuous Exercises.

1. What is the cost of 450 yards of cloth, at £1 17*s.* 6*d.* sterling, per yard, exchange on London being 10 per cent advance?

2. What is the cost of 150 yards, at £1 10*s.* sterling, per yard, exchange being calculated at 8 per cent advance?

3. What is the cost of 146 lbs., at 3*s.* 6*d.* sterling, per lb., exchange on London being 8½ per cent advance?

4. What is the cost of 4152 yards of silk, at 3 francs, 75 centimes per yard, exchange on Paris being 19½ cents?

5. What is the cost of 5000 yards of silk, at 2 francs, 50 centimes per yard, exchange on Paris being 18¾ cents?

6. What must I sell 300 yards of cloth for, which cost me in London £1 12*s.* 6*d.* sterling, per yard, exchange being 7¾ per cent advance, so as to gain 5 per cent on the cost?

7. What must I sell 250 yards of cloth for, which cost me £1 15*s.* 6*d.* sterling, exchange on London being calculated at 6 per cent advance, so as to gain 10 per cent on the cost?

8. What must I sell 300 lbs for, if they cost 6*s.* 3*d.* per lb., and the exchange on London is 7½ per cent advance, if I wish to gain 10 per cent on the prime cost?

9. What must I sell 400 yards of French silk, if the French ell cost 2 francs, 50 centimes, and the exchange on Paris is 19½ cents, so as to gain 20 per cent on the prime cost?

10. What must I sell 500 yards of cloth per yard, if the prime cost of them in England is 5*s.* 9½*d.* per yard, and the exchange on London, is at 2½ per cent discount, so as to gain 25 per cent on the prime cost?

11. What must I sell 500 yards of silk per yard, if the prime cost is 3 francs, 75 centimes per French ell; exchange on Paris being 19$\frac{1}{2}$ cents, so as to gain 20 per cent on the cost?

12. What must I sell 400 yards of Brabant lace per yard, if the prime cost of 1 ell Flemish, is 1 franc, 35 centimes; exchange on France or Belgium being 18$\frac{3}{4}$ cents, so as to gain 24 per cent on the cost?

THE END

Lloyd Sturms